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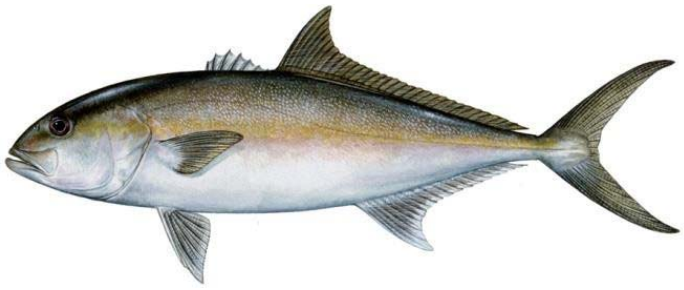
Modifications to the Greater Amberjack Fishing Year and the Recreational Fixed Closed Season



Final Framework Action to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico

Including Environmental Assessment, Regulatory Impact Review, and Regulatory Flexibility Act Analysis

November 2017

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ENVIRONMENTAL ASSESSMENT COVER SHEET

Name of Action

Modifications to the Greater Amberjack Fishing Year and the Recreational Fixed Closed Season, including Environmental Assessment, Regulatory Impact Review, and Regulatory Flexibility Act Analysis.

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Type of Action

( ) Administrative	( ) Legislative
( ) Draft	(X) Final

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
ACT	annual catch target
ALS	accumulated landings system
AM	accountability measure
Bmsy	stock biomass level capable of producing an equilibrium yield of MSY
Council	Gulf of Mexico Fishery Management Council
CS	consumer surplus
DPS	distinct population segment
EA	Environmental Assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
EJ	environmental justice
E.O.	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FL	fork length
FMP	Fishery Management Plan
F_{MSY}	fishing mortality rate corresponding to an equilibrium yield of MSY
FSSI	Federal Strategic Sourcing Initiative
FTE	full-time equivalent
GSAD	Gulf and South Atlantic Dealer
Gulf	Gulf of Mexico
HAPC	Habitat Area of Particular Concern
IFQ	Individual Fishing Quota
IPCC	Intergovernmental Panel on Climate Change
M	Instantaneous rate of natural mortality
mp	million pounds
Magnuson-Steven Act	Magnuson-Steven Fishery Conservation and Management Act
MFMT	Maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Survey and Statistics
MRIP	Marine Recreational Information Program
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration
NOR	net operating revenue
Opinion	biological opinion
OY	Optimum yield

PAH	polyaromatic hydrocarbons
PS	producer surplus
RA	Regional Administrator
RFA	Regulatory Flexibility Act
RIR	Regulatory impact review
RQ	regional quotient
Secretary	Secretary of Commerce
SEDAR	Southeast Data, Assessment and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SPR	Spawning potential ratio
SRD	Science Research Director
SRHS	Southeast Region Headboat Survey
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
TL	total length
TPWD	Texas Parks and Wildlife Department
VOC	volatile organic compounds
ww	whole weight

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CHAPTER 1. INTRODUCTION

1.1 Background

In 2016, the greater amberjack stock assessment update to Southeast Data Assessment and Review (SEDAR) 33 (2016) was completed and reviewed by the Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) at their March 2017 meeting. The SSC accepted the greater amberjack update assessment as the best scientific information available and concluded that greater amberjack was still overfished and undergoing overfishing and the stock would not be rebuilt by 2019 as previously projected. To address the results of the most recent stock assessment, the Council recently completed a framework action (GMFMC 2017) and requested that the Secretary of Commerce (Secretary) implement a rule to modify the acceptable biological catch (ABC), sector specific annual catch limits (ACL), and annual catch targets (ACT) for greater amberjack (Table 1.1.1.). Relative to the status quo, this results in a reduction in harvest for the 2018 and 2019 fishing years, with an increase in 2020 and beyond, and is expected to end overfishing and rebuild the stock by 2027.

Table 1.1.1. Acceptable biological catch (ABC), annual catch limits (ACL), and annual catch targets (ACT) that were established based on the greater amberjack update stock assessment (SEDAR 33 2016) that indicated the stock was overfished and experiencing overfishing. The initial reduction in allowable harvest is expected to rebuild the stock by 2027.

		Recreational		Commercial	
Year	**ABC**	**ACL**	**ACT**	**ACL**	**ACT**
2018	1,182,000	862,860	716,173	319,140	277,651
2019	1,489,000	1,086,970	902,185	402,030	349,766
2020+	1,794,000	1,309,620	1,086,985	484,380	421,411

Source: GMFMC 2017

In addition, accountability measures put in place through Reef Fish Amendment 30A (GMFMC 2008) require the Regional Administrator (RA) to close the respective sector of the fishery when the quota (i.e., ACT) has been met and reduce the sector ACL and sector ACT in the following year by the amount of any overage of the ACL. Overage adjustments resulting from these accountability measures have occurred in both the recreational and commercial sectors and have led to dramatically shortened fishing seasons in some years.

The fishing year for most reef fish species is January 1 – December 31 (GMFMC 1981). As a result, many species are open to harvest on January 1 each year, but the season may be closed prior to year's end if a species is subject to in-season monitoring and reaches its ACL or ACT (GMFMC 2011). The result is that there may be fewer reef species open to harvest later in the calendar year. This could be attributed to socioeconomic preferences, prevailing weather patterns, market conditions, or migratory patterns of some species and thus, may not maximize the benefit from the reef fish resource. At the August 2017 meeting, the Council discussed

opening recreational fishing for greater amberjack later in the calendar year to improve fishermen's access to greater amberjack and provide an opportunity to harvest a prized reef fish species during a period of the year when some other desirable species are prohibited from harvest.

For the recreational sector, greater amberjack opens to harvest January 1 each year but is closed June 1 – July 30. This two-month fixed closed season was implemented to reduce effort during a period of historically high fishing effort and extend the season later in the year (along with more total open days of fishing). In the recently completed framework action (GMFMC 2017), the Council selected a January 1 – June 30 recreational closed season with the intent that this would take effect in early 2018. However, the Council recognized that this season may not meet the needs of anglers Gulf of Mexico (Gulf)-wide and it may be preferable to have separate spring and fall fishing seasons. Therefore, the Council decided to seek additional public input on alternative closed seasons and is considering a longer-term closed season that balances stakeholder access with the requirement to end overfishing and rebuild the stock.

1.2 Purpose and Need

The purpose of this amendment is to modify the greater amberjack fishing year and the greater amberjack recreational fixed closed season.

The need for this amendment is to extend the greater amberjack recreational fishing season while constraining harvest to the management target, end overfishing, and rebuild the greater amberjack stock in the Gulf in a timely manner.

1.3 History of Management

The Reef Fish Fishery Management Plan (Reef Fish FMP) (with environmental impact statement [EIS]) was implemented in November 1984. The original list of species included in the management unit consisted of snappers, groupers, and sea basses. Gray triggerfish and *Seriola* species, including greater amberjack, were in a second list of species included in the fishery, but not in the management unit. The species in this list were not considered to be target species because they were generally taken incidentally to the directed fishery for species in the management unit. Their inclusion in the Reef Fish FMP was for purposes of data collection, and their take was not regulated.

Amendment 1 (with environmental assessment [EA]) implemented in 1990, added greater amberjack and lesser amberjack to the list of species in the management unit. It set a greater amberjack recreational minimum size limit of 28 inches fork length (FL), a three-fish recreational bag limit, and a commercial minimum size limit of 36 inches FL. This amendment's objective was to stabilize the long-term population levels of all reef fish species. A framework procedure for specification of total allowable catch (TAC) was created to allow for annual management changes. This amendment also established a commercial vessel reef fish permit as a requirement for harvest in excess of the bag limit and for the sale of reef fish.

Amendment 4 (with EA), implemented in 1992, added banded rudderfish and almaco jack to the management unit, and established a moratorium on the issuance of new commercial reef fish vessel permits for a maximum period of 3 years.

Amendment 5 (with supplemental EIS), implemented in 1994, required that all finfish, except for oceanic migratory species, be landed with head and fins attached, and closed the region of Riley's Hump (near Dry Tortugas, Florida) to all fishing during May and June to protect mutton snapper spawning aggregations

Amendment 12 (with EA), submitted in 1995 and implemented in 1997, reduced the greater amberjack bag limit from three fish to one fish per person, and created an aggregate bag limit of 20 reef fish for all reef fish species not having a bag limit (including lesser amberjack, banded rudderfish, almaco jack and gray triggerfish). The National Marine Fisheries Service (NMFS) disapproved proposed provisions to include lesser amberjack and banded rudderfish along with greater amberjack in an aggregate one-fish bag limit and to establish a 28-inch FL minimum size limit for those species.

Amendment 15 (with EA), implemented in 1998, closed the commercial sector for greater amberjack in the Gulf during the months of March, April, and May.

A Regulatory Amendment (with EA), implemented in 1999, closed two areas (i.e., created two marine reserves), 115 and 104 square nautical miles respectively, year-round to all fishing under the jurisdiction of the Council with a 4-year sunset clause.

Generic Sustainable Fisheries Act Amendment (with EA), partially approved and implemented in 1999, set the maximum fishing mortality threshold (MFMT) for greater amberjack at the fishing mortality necessary to achieve 30% of the unfished spawning potential ratio (SPR) F30% SPR. Estimates of maximum sustainable yield (MSY), minimum stock size threshold (MSST), and optimum yield (OY) were disapproved because they were based on SPR proxies rather than biomass-based estimates.

Secretarial Amendment 2 (with EIS), implemented in 2003, specified MSY for greater amberjack as the yield associated with $F_{30\% SPR}$ (proxy for F_{MSY}) when the stock is at equilibrium, OY as the yield associated with an $F_{40\% SPR}$ when the stock is at equilibrium, MFMT equal to $F_{30\%SPR}$, and MSST equal to (1-M)*B_{MSY} (where M = natural mortality) or 75% of B_{MSY}. It also set a rebuilding plan limiting the harvest to 2,900,000 lbs for 2003-2005, 5,200,000 lbs for 2006-2008, 7,000,000 lbs for 2009-2011, and for 7,900,000 lbs for 2012. This was expected to rebuild the stock in 7 years. Regulations implemented in 1997 and 1998 (Amendments 12 and 15 to the Reef Fish FMP) were deemed sufficient to comply with the rebuilding plan so no new regulations were implemented.

Amendment 30A (with EIS), implemented in 2008, was developed to stop overfishing of gray triggerfish and greater amberjack. The amendment established ACLs and accountability measures (AM) for greater amberjack and gray triggerfish. For greater amberjack, the rebuilding plan was modified, increasing the recreational minimum size limit to 30 inches FL,

implementing a zero bag limit for captain and crew of for-hire vessels, and setting commercial and recreational ACTs (quotas). **Amendment 30A** also established an allocation for greater amberjack harvest of 73% recreational and 27% commercial, which would be in effect until such time that the Council, through the recommendations of an Ad Hoc Allocation Committee, could implement a separate amendment that fairly and equitably allocated Reef Fish FMP resources between recreational and commercial sectors.

A Regulatory Amendment (with EA), implemented in 2011, specified the greater amberjack recreational closed season from June 1 – July 31. The intended effect of this final rule was to mitigate the social and economic impacts associated with implementing in-season closures.

Amendment 35 (with EA), implemented in 2012 in response to a 2010 update stock assessment, established a new ACL equal to the ABC at 1,780,000 lbs, which was less than the current ACL of 1,830,000 lbs. Reducing the ABC by 18% was expected to end overfishing. The rule also established a commercial trip limit of 2,000 lbs whole weight (ww) throughout the fishing year. The Council also considered bag limits and closed season management measures for the recreational sector but did not alter any recreational management measures.

2015 Framework Amendment (with EA), implemented in 2016 decreased the total ACL from 1,780,000 lbs to 1,720,000 lbs, set the commercial ACL at 464,400 lbs and the commercial ACT (quota) at 394,740 lbs, set the recreational ACL at 1,255,600 lbs and the recreational ACT (quota) at 1,092,372 lbs, reduced the commercial trip limit from 2,000 lbs to 1,500 lbs, and increased the recreational minimum size limit from 30 inches FL to 34 inches FL.

2017 Framework Amendment (with EA), was submitted to the Secretary for review in 2017. If approved, the Secretary would implement regulations to set the recreational greater amberjack ACL at 862,860 lbs ww for 2018, 1,086,970 lbs ww for 2019, and 1,309,620 lbs ww for 2020 and subsequent fishing years. The commercial greater amberjack ACL would be 319,140 lbs ww for 2018, 402,030 lbs ww for 2019, and 484,380 lb ww for 2020 and subsequent fishing years. The recreational greater amberjack ACT (quota) would be 716,173 lb ww for 2018, 902,185 lbs ww for 2019, and 1,086,985 lbs ww for 2020 and subsequent fishing years and the commercial greater amberjack ACT (quota) would be 277,651 lbs ww for 2018, 349,766 lbs ww for 2019, and 421,411 lbs ww for 2020 and subsequent fishing years. In addition, this framework would modify the recreational seasonal closure to be January 1 through June 30 each year.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1– Modify the Fishing Year for Greater Amberjack

Alternative 1: No Action – Do not modify the current January 1 – December 31 fishing year for the recreational and commercial sectors.

Preferred Alternative 2: Modify the fishing year to be August 1 – July 31.

Preferred Option a: Modify the recreational fishing year.
Option b: Modify the recreational and the commercial fishing year.

Alternative 3: Modify the fishing year to be September 1 – August 31.

Option a: Modify the recreational fishing year.
Option b: Modify the recreational and the commercial fishing year.

Discussion

The fishing year for most reef fish species (including greater amberjack) is based on the calendar year, January 1 – December 31 **(Alternative 1)** and was established in the original reef fish Fishery Management Plan (FMP; GMFMC 1981).

Preferred Alternative 2 would modify the fishing year for greater amberjack to begin each year on August 1 and extend through July 31. This would create a fishing year for greater amberjack that differs from all other federally managed reef fishes except yellowtail snapper that was recently changed to an August 1 through July 31 fishing year (GMFMC 2016). Under current management, many reef fish species open to harvest each year on January 1 but some species close before the end of the calendar year if the annual catch limit (ACL) or annual catch target (ACT) is met or projected to be met. The result is that fewer species may be open to harvest later in the calendar year. In some regions of the Gulf of Mexico (Gulf), the early portion of each calendar year is less desirable for fishing as weather, and market conditions affect fishing effort. **Preferred Alternative 2** could provide access to a highly prized species later in the calendar year during a period of the year when the harvest of other prized species (e.g., red snapper) is typically prohibited in federal waters. **Preferred Option a** would only modify the fishing year for the recreational sector where problems associated with short seasons and in-season closures are most acute. However, **Preferred Option a** would create a disparity in the fishing year for greater amberjack between the commercial and recreational sectors. This may complicate efforts to monitor annual harvest or determine when the combined ACL has been met. **Option b** would establish an August 1 – July 31 fishing year for both sectors and allow for estimates of total harvest (i.e., both recreational and commercial sectors) that is within the same time period that is useful for stock assessments and monitoring the progress of the rebuilding plan. **Alternative 3** would modify the fishing year for greater amberjack to begin September 1

and end August 31 of the following calendar year. Similar to **Preferred Alternative 2**, **Alternative 3** includes two options that would affect the recreational sector **(Option a)** or apply to both the recreational and commercial sectors **(Option b)**. Similar to **Preferred Alternative 2**, **Alternative 3** could provide access to greater amberjack later in the calendar year.

Both **Preferred Alternative 2** and **Alternative 3** would impact the recreational landings monitoring processes for three of the Gulf states (Florida, Alabama, and Mississippi). Recreational landings of greater amberjack from private anglers and state permitted for-hire vessels are estimated via the Marine Recreational Information Program (MRIP) in six two month waves for these three states; Louisiana and Texas recreational landings are monitored through state programs. Greater amberjack is managed based on the ACT and harvest is prohibited when sector specific ACTs are met or projected to be met. **Preferred Alternative 2** would require establishing a procedure to split wave 4 (July – August landings) into separate fishing years. This could increase the uncertainty of the landings estimate and cause delays in producing estimates of annual harvest. **Alternative 3** would move the start of the fishing year back one month in comparison to **Preferred Alternative 2**, and, therefore, would not require an adjustment for splitting the waves in the MRIP fishery data. **Alternative 3** may be preferable from a data management perspective, but this may not provide access to the fishery in August each year if the ACL is projected to be met before the end of each fishing year.

Under **Preferred Alternative 2**, the 2017/2018 recreational fishing year will occur from the effective date of implementation through July 31, 2018. The 2018/2019 fishing year will begin on August 1, 2018 and extend through July 31, 2019. Each subsequent recreational fishing year will also begin on August 1 and extend through July 31 of the following calendar year. Under **Alternative 3**, the 2017/2018 recreational fishing year will occur from the effective date of implementation and extend through August 31, 2018. Under **Alternative 3**, the 2018/2019 fishing year would begin on September 1, 2018 and extend through August 31, 2019. Each subsequent recreational fishing year will also begin on September 1 and extend through September 30 of the following calendar year. Under **Preferred Alternative 2** or **Alternative 3**, the 2017/2018 recreational fishing year will use the 2018 recreational ACL and recreational ACT, the 2018/2019 fishing year will use the 2019 recreational ACL and recreational ACT, and the 2019/2020 and beyond fishing years will use the 2020 recreational ACL and recreational ACT established in the most recent greater amberjack framework action (GMFMC 2017).

2.2 Action 2 – Modify the Recreational Fixed Closed Season for Greater Amberjack

Alternative 1: No Action – Do not modify the current regulatory recreational fixed closed season. The current fixed closed season is June 1 - July 31. However, the Gulf of Mexico Fishery Management Council (Council) has proposed a recreational fixed closed season of January 1 - June 30, which may be implemented in 2018, if approved by the Secretary of Commerce (Secretary). This alternative also addresses that proposed fixed closed season.

Alternative 2: Modify the recreational fixed closed season to be January 1 – March 31 and May 1 – July 31 (open April 1-April 30 and August 1-December 31).

Alternative 3: Modify the recreational fixed closed season to be January 1 – April 30 and June 1 – July 31 (open May 1-May 31 and August 1-December 31).

Alternative 4: Modify the recreational fixed closed season to be January 1 – March 31 and May 1 – August 31 (open April 1-April 30 and September 1 –December 31).

Alternative 5: Modify the recreational fixed closed season to be January 1 – April 30 and June 1 – August 31 (open May 1- May 31 and September 1-December 31).

Preferred Alternative 6: Modify the recreational fixed closed season to be January 1 – April 30, June 1 – July 31, and November 1 – December 31 (open May 1 – May 31 and August 1 – October 31).

Discussion

Alternative 1 would maintain the current regulatory recreational fixed closed season of June 1 - July 31 that was put in place to reduce the likelihood of an in-season ACT (quota) closure and allow greater amberjack to be harvested when recreational red snapper harvest was prohibited. Greater amberjack accountability measures state that in-season monitoring is based off of the quota to aid in prevention of an ACL overage. However, this fixed closed season has not worked as intended as red snapper is now closed the majority of the year and greater amberjack closures have occurred earlier in the season in recent years due to paybacks from previous year overages. This has led to the quota being met sooner in recent years (Table 2.2.1). These closures have not allowed for recreational greater amberjack to be harvested after red snapper has closed since 2015.

Table 2.2.1. Recreational greater amberjack closures from 2013-2017.

Year	Closure Date
2017	March 24
2016	June 1
2015	September 28
2014	August 24
2013	None

Both red snapper and greater amberjack are frequently targeted and prized species, thus anglers would like to maximize the opportunity to harvest at least one of these species on a trip. Currently, the recreational fishing season for red snapper begins on June 1 when the recreational greater amberjack season is closed. Anglers only have the opportunity to harvest one of these targeted species during the summer months. Shorter recreational greater amberjack and recreational red snapper fishing seasons have led to harvest prohibitions on both species at the same time, therefore not allowing the **Alternative 1** fixed closed season of June 1 – July 31 to achieve one of its original purposes. While **Alternative 1** retains a greater amberjack fixed recreational closed season during the months with the greatest historical fishing effort (see Figure 2.2.1), it is not expected to eliminate an in-season quota closure under any of the alternatives from Action 1 (Table 2.2.2). The current June 1 – July 31 fixed closed season also allows for harvest of greater amberjack during peak spawning months of March and April, found by the majority of the studies conducted in the Gulf (Wells and Rooker 2002; Murie and Parkyn 2008; SEDAR 33 2014).

The **Proposed Alternative 1** January 1 – June 30 recreational fixed closed season was selected by the Council as its' preferred at the August 2017 meeting to provide access to the fishery while achieving the harvest reductions necessary to end overfishing and rebuild the stock. The Council recognized that further deliberation would be helpful to determine whether this is the most appropriate recreational fixed closed season but did not want to delay implementation of the harvest reductions necessary to end overfishing and rebuild the stock. Establishing a January 1– June 30 recreational fixed closed season was expected to prevent the recreational season from opening on January 1, 2018, and allow additional time to consider the most appropriate recreational fixed closed season. The January 1– June 30 recreational fixed closed season would prohibit recreational harvest during the peak spawning period found in the majority of the studies in the Gulf (March through April) and down into the Florida Keys (April through May) (Harris et al. 2007). **Proposed Alternative 1** would prevent harvest during the predicted period of the greatest recreational fishing effort based on historical landings (see Figure 2.2.1). **Proposed Alternative 1** would also allow for greater amberjack harvest after red snapper has historically closed for private anglers in federal waters as the greater amberjack season would begin on July 1. While the **Proposed Alternative 1** January 1 – June 30 recreational fixed closed season would allow for harvest of greater amberjack later in the calendar year and extend the season, it may not prevent an in-season quota closure during 2018 if catch rates are high. For 2019 and beyond, recreational landings are expected to remain below the quota under **Proposed Alternative 1** when compared to every alternative in Action 1 (Table 2.2.2, Figure 2.2.2, Figure 2.2.3, Figure 2.2.4), which means an in-season closure is not expected.

Alternative 2 would establish a January 1 – March 31 and May 1 – July 31 recreational fixed closed season. This would allow for a spring opening in April and a fall season starting in August. **Alternative 2** would allow for a closure during part of peak spawning in the majority of the Gulf and still allow a spring season during a time of recent high fishing effort (trips). This would also allow for harvest of greater amberjack after the red snapper season has typically closed. Season length is in part determined by the fishing year selected in Action 1 but a quota closure is expected under all Action 1 alternatives for 2018-2019 (Table 2.2.2, Figure 2.2.2, Figure 2.2.3, Figure 2.2.4).

Alternative 3 would establish a January 1 – April 30 and June 1 – July 31 recreational fixed closed season. Similar to **Alternative 2**, **Alternative 3** would allow for a fall season starting in August but a spring season opening in May. **Alternative 3** would allow for a closure during peak spawning in the majority of the Gulf and still allow a spring season during a time of recent high fishing effort (trips). This would also allow for harvest of greater amberjack when the red snapper season is typically closed. Season length is expected to close in 2018 under all Action 1 alternatives (Table 2.2.2). However, harvest under the **Alternative 3** recreational fixed closed season is not expected to reach the quota for any fishing year selected in Action 1 from 2019 and beyond (Figure 2.2.2, Figure 2.2.3, Figure 2.2.4). Although quota is estimated to be unharvested from 2019 and beyond, the least amount of quota is estimated to go unharvested under **Alternative 3** compared to any combination of Action 1 and Action 2 alternatives except for Action 2 **Proposed Alternative 1** or **Alternative 2**, which would only occur from 2020 and beyond.

Alternative 4 would establish a January 1 – March 31 and May 1 – August 31 recreational fixed closed season. This would allow for a spring opening in April and a later fall season starting in September. Similar to **Alternative 2**, **Alternative 4** would allow for a closure during part of peak spawning in the majority of the Gulf, still allow a spring season and harvest of greater amberjack when the red snapper season is typically closed. The recreational season is not estimated to close beyond 2018 for any alternative in Action 1 (Table 2.2.2). However, under **Alternative 4**, quota is estimated to be left over every year under any Action 1 alternative (Figure 2.2.2, Figure 2.2.3, Figure 2.2.4) and days open are estimated to result in the second shortest amount of fishing days from 2018 onward. **Alternative 4** is estimated to have the second highest amount unharvested quota from 2018 and beyond.

Alternative 5 would establish a January 1 – April 30 and June 1 – August 31 recreational fixed closed season. This would allow for a spring opening in May and a later fall season starting in September. Similar to **Alternative 3**, **Alternative 5** would allow for a closure during peak spawning in the majority of the Gulf, allow a spring season and harvest of greater amberjack when the red snapper season is typically closed. The recreational season is not estimated to close beyond 2018 for any alternative in Action 1 (Table 2.2.2). However, the most unharvested quota each year is estimated with **Alternative 5** (Figure 2.2.2, Figure 2.2.3, Figure 2.2.4). **Alternative 5** is estimated to result in one of the fewest fishing days from 2018 onward with only one more day estimated to be open than **Alternative 4**.

Preferred Alternative 6 would establish a January 1 – April 30, June 1 – July 31, and November 1 – December 31 recreational fixed closed season. Similar to **Alternative 2** and **Alternative 3**, **Preferred Alternative 6** would allow for a fall season starting in August. Like **Alternative 3**, it would also allow a spring season opening in May. However, unlike **Alternatives 1-5**, **Preferred Alternative 6** would also establish a November 1 – December 31 recreational fixed closed season. Similar to **Alternative 3**, **Preferred Alternative 6** would allow for a closure during peak spawning in the majority of the Gulf and allow a spring season. This would also allow for harvest of greater amberjack before and after when the red snapper season is closed although an in-season closure is expected in 2018 under all Action 1 alternatives (Table 2.2.2). Harvest under the **Preferred Alternative 6** recreational fixed closed season is not expected to reach the quota for any fishing year selected in Action 1 from 2019 and beyond (Figure 2.2.2, Figure 2.2.3, Figure 2.2.4). Although quota is estimated to be unharvested from 2019 and beyond, the ability to have a spring and fall season would be achieved.

Combined Impacts of Actions 1 and 2

A decision support tool was developed to evaluate the alternatives in Actions 1 and 2 relative to the expected length (days), closure date, and leftover quota of the recreational fishing season (Table 2.2.2, Figure 2.2.2, Figure 2.2.3, Figure 2.2.4). Each fishing year alternative in Action 1 is compared to the potential fixed closed seasons in Action 2. In Action 1, Alternatives 2 and 3 would lead to more fishing days than Alternative 1 for each fixed closed season alternative in Action 2. If the fishing year begins later in the year, harvest would occur during times of historical low effort therefore allowing the amount of fishing days to increase. In terms of season length, the longest predicted season in 2018 in fishing days would be achieved with a June 1 - July 31 fixed closed season (**Alternative 1**), with the selection of Alternative 3 in Action 1 (209 days). While **Alternative 1** is the current recreational fixed closed season, **Proposed Alternative 1** was submitted to the Secretary for approval. If implemented, **Proposed Alternative 1** (January 1 – June 30) with the selection in this document of either Alternative 2 or 3, is estimated to produce the greatest amount of fishing days in 2018 (165). A quota closure is estimated to occur under all of these action and alternatives in 2018; however, only for **Alternative 1** in 2019 and beyond. There is uncertainty in the estimates produced by the decision tool because it assumes future catch rates will continue however, in practice catch rates may increase or decrease for various reasons. However, this information is important so a baseline for all years could be explored. While **Alternative 1** results in the largest number of days open (up to 249 days) compared to **Proposed Alternative 1, Alternatives 2-5**, and **Preferred Alternative 6** under various Action 1 alternatives from 2019 and beyond, it still allows for harvest of greater amberjack during peak spawning season and a quota closure is expected for any combination of action and alternatives in Actions 1 and 2. All closures under **Alternative 1** except for one are estimated to occur in the early spring. **Proposed Alternative 1** results in the second greatest number of days open (up to 184 days) compared to **Alternatives 2-5**, and **Preferred Alternative 6** under various Action 1 alternatives from 2019 and beyond and is not expected to result in a quota closure. While **Proposed Alternative 1** prevents harvest during all peak greater amberjack spawning in the Gulf, it does not allow for a spring harvest.

Alternatives 2 and **4** will only prevent harvest during part of greater amberjack peak spawning. **Alternative 2** is expected to have a quota closure under any Action 1 alternative combination from 2018 through 2019 and results in less fishing days open (up to 183 days) than **Alternative 1**, **Proposed Alternative 1**, or **Alternative 3** for all years. **Alternative 2** also results in the smallest number of days open in 2018 (90 days) with a selection of Action 1 Alternative 1. **Alternative 4** is not expected to have a quota closure during any year with any action and alternative combination; however, it does result in the second fewest number of fishing days from 2019 onward (152 days) and the second highest amount of quota left over each year. **Alternatives 3**, **5**, and **Preferred Alternative 6** prevent harvest during the majority of greater amberjack peak spawning season in the Gulf. **Alternative 3** results in the second most days open (up to 184 days) under the majority of action and alternative combinations and the least amount of quota leftover when a closure is not expected to occur other than **Proposed Alternative 1** or **Alternative 2** from 2020 and beyond. While **Alternative 5** is not expected to have a quota closure during any year with any action and alternative combination, it does result in the third fewest amount of fishing days from 2019 onward (153 days). **Alternative 5** would also leave a gap between when red snapper closes and greater amberjack would reopen when neither species would be open for harvest, which fishermen have stated in public testimony that they want to avoid. **Preferred Alternative 6** results in the fewest number of fishing days from 2019 and beyond (123 days) but is expected to allow for a spring and fall season even if harvest rates increase in the future.

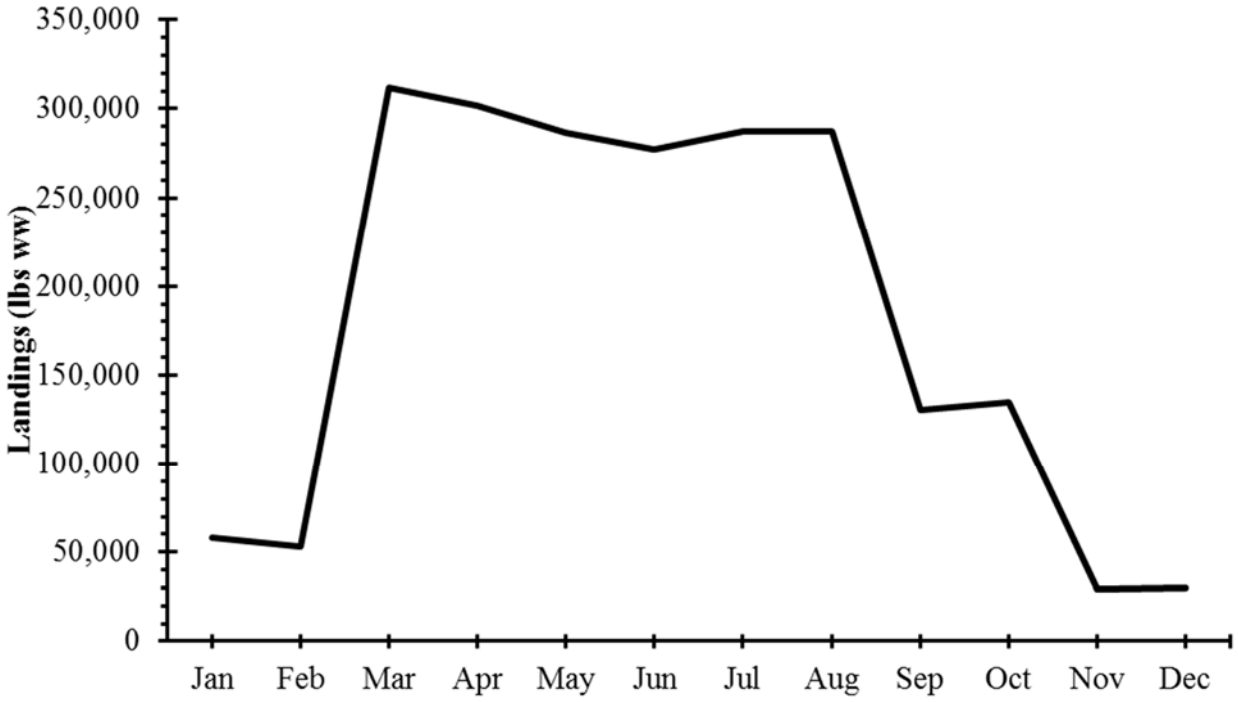

Figure 2.2.1. Distribution by month of predicted future landings for the Gulf of Mexico greater amberjack recreational landings based on historical landings. Predictions were estimated due to harvest being closed before the end of the year since 2014. The predicted recreational landings

include MRIP, Southeast Region Headboat Survey (SRHS), Texas Parks and Wildlife Department (TPWD), and Louisiana (LA) Creel landings.

Table 2.2.2. Greater amberjack projected recreational sector season length (number of days) and closure date, based on proposed 2018, 2019, and 2020 and beyond ACTs from GMFMC 2017 with optional fixed closed seasons (Action 2) and fishing year (Action 1) alternatives.

Action 1: Fishing Year	Action 2: Fixed Closed Season	Estimated Season Length (number of days) and Closure Date		
		2018	2019	2020 and beyond
Alternative 1 January 1 – December 31	**Alt. 1** June 1- July 31 (current)	119	140	161
		April 30	May 20	August 9
	Alt. 1 January 1- June 30 (proposed rule)	94	184	184
		October 3	NONE	NONE
	Alt. 2 January 1 – March 31 and May 1 – July 31	90	173	183
		September 30	December 21	NONE
	Alt. 3 January 1 – April 30 and June 1 – July 31	94	184	184
		October 3	NONE	NONE
	Alt. 4 January 1 – March 31 and May 1 – August 31	152	152	152
		NONE	NONE	NONE
	Alt. 5 January 1 – April 30 and June 1 – August 31	153	153	153
		NONE	NONE	NONE
	Preferred Alt. 6 January 1 – April 30, June 1 – July 31, and November 1 – December 31	94	123	123
		October 2	NONE	NONE
Preferred Alternative 2 August 1 – July 31	**Alt. 1** June 1- July 31 (current)	148	230	249
		February 25	March 18	April 6
	Alt. 1 January 1- June 30 (proposed rule)	165	184	184
		July 12	NONE	NONE
	Alt. 2 January 1 – March 31 and May 1 – July 31	164	182	183
		April 11	April 29	NONE
	Alt. 3 January 1 – April 30 and June 1 – July 31	165	184	184
		May 12	NONE	NONE

	Alt. 4 January 1 – March 31 and May 1 – August 31	152	152	152
		NONE	NONE	NONE
	Alt. 5 January 1 – April 30 and June 1 – August 31	153	153	153
		NONE	NONE	NONE
	Preferred Alt. 6 January 1 – April 30, June 1 – July 31, and November 1 – December 31	109	123	123
		May 16	NONE	NONE
Alternative 3 September 1 – August 31	**Alt. 1** June 1- July 31 (current)	209	228	247
		3/28	4/16	5/5
	Alt. 1 January 1- June 30 (proposed rule)	165	184	184
		August 12	NONE	NONE
	Alt. 2 January 1 – March 31 and May 1 – July 31	162	182	183
		August 10	August 31	NONE
	Alt. 3 January 1 – April 30 and June 1 – July 31	162	184	184
		August 12	NONE	NONE
	Alt. 4 January 1 – March 31 and May 1 – August 31	152	152	152
		NONE	NONE	NONE
	Alt. 5 January 1 – April 30 and June 1 – August 31	153	153	153
		NONE	NONE	NONE
	Preferred Alt. 6 January 1 – April 30, June 1 – July 31, and November 1 – December 31	109	123	123
		August 16	NONE	NONE

Source: NMFS-SERO. Gulf_GAJ_rec_decision_Tool_August2017_v10.xlsm

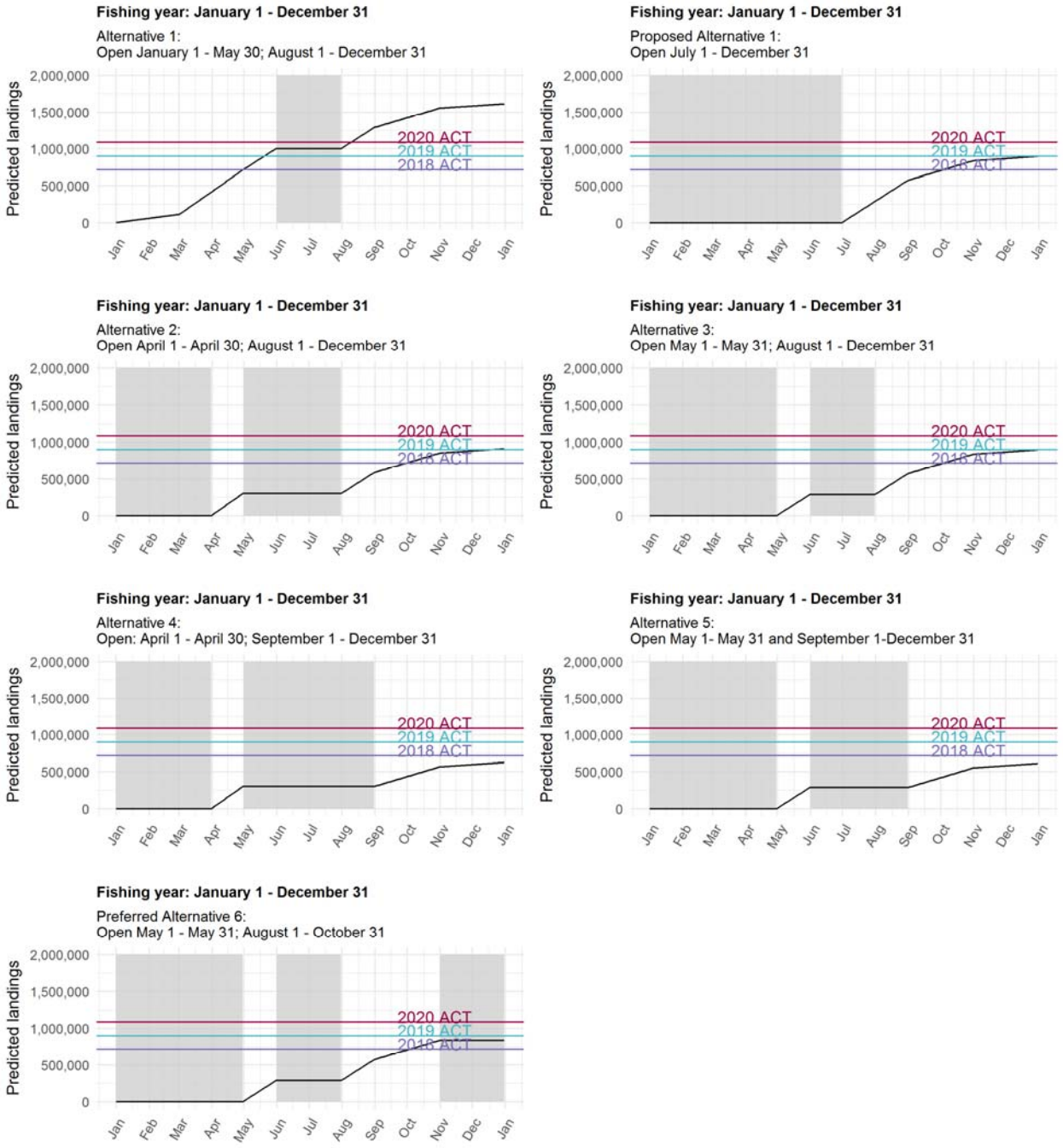

Figure 2.2.2. Predicted recreational harvest of greater amberjack (black line) for years 2018-2020 and beyond under Action 1 Alternative 1 and all Action 2 Alternatives (shaded area indicates closed season).
Source: NMFS-SERO. Gulf_GAJ_rec_decision_Tool_August2017_v10.xlsm

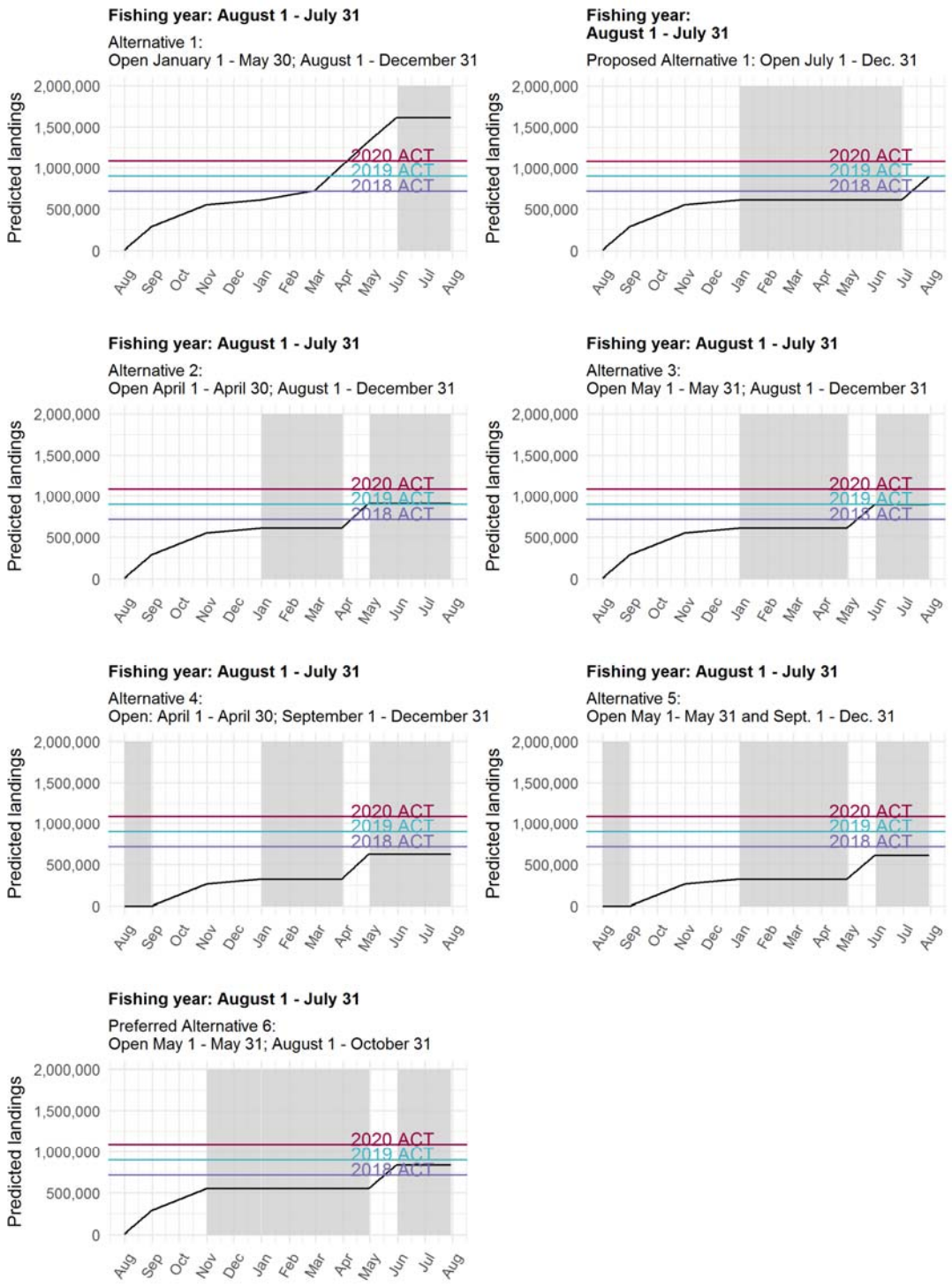

Figure 2.2.3. Predicted recreational harvest of greater amberjack (black line) for years 2018-2020 and beyond under Action 1 Alternative 2 and all Action 2 Alternatives (shaded area shaded area indicates closed season).
Source: NMFS-SERO. Gulf_GAJ_rec_decision_Tool_August2017_v10.xlsm

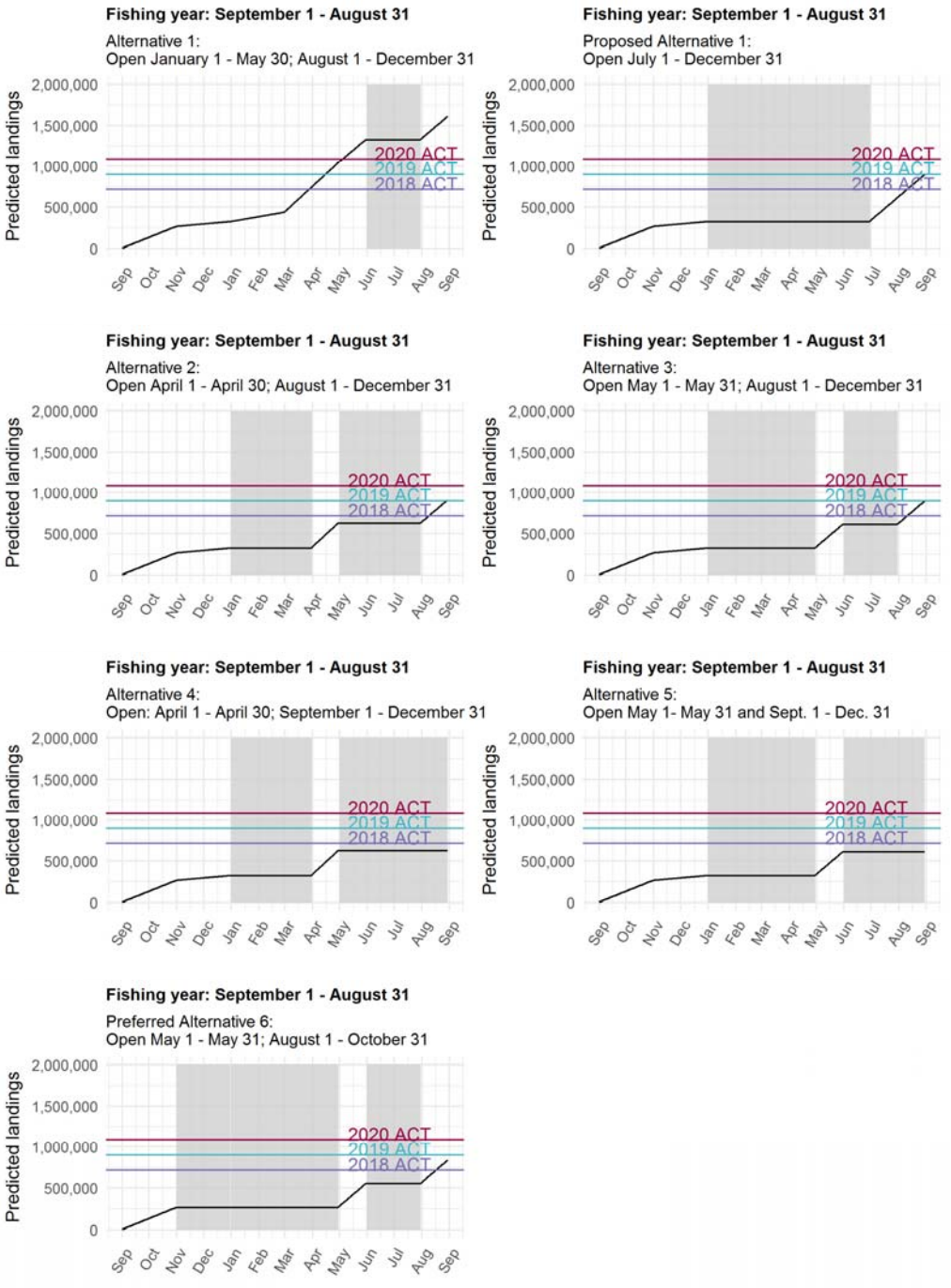

Figure 2.2.4. Predicted recreational harvest of greater amberjack (black line) for years 2018-2020 and beyond under Action 1 Alternative 3 and all Action 2 Alternatives (shaded area shaded area indicates closed season).
Source: NMFS-SERO. Gulf_GAJ_rec_decision_Tool_August2017_v10.xlsm.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Description of the Fishery

A more complete description of the description of the fishery can be found in Chapter 3 of Framework to the Reef Fish Fishery Management Plan (FMP) for modifications to greater amberjack allowable harvest and rebuilding plan (GMFMC 2017). That description is summarized in the following sections and incorporated herein by reference.

The commercial and recreational fishing year for greater amberjack in the exclusive economic zone (EEZ) off the Gulf of Mexico (Gulf) states currently begins on January 1 and ends December 31. The recreational sector has a current seasonal closure of June 1 through July 31. However, the Gulf of Mexico Fishery Management Council (Council) proposed a recreational fixed closed season of January 1 - June 30, which will be in effect in 2018, upon implementation by the Secretary of Commerce (Secretary). The commercial sector currently has a March 1 through May 31 seasonal closure. The intent of the seasonal closures was to prevent in-season quota fishing year closures and to reduce fishing mortality during peak spawning months. Additional greater amberjack management measures for fish harvested recreationally include a 34 inch fork length (FL) minimum size limit, a bag limit of one fish per person per day, a zero bag limit for captain and crew of for-hire vessels, and accountability measures (AM). Management measures for fish harvested commercially include a 36-inch FL minimum size limit, a trip limit of 1,500 lbs whole weight, and AMs. These AMs state that if recreational or commercial landings reach or are projected to reach the annual catch target (ACT) (quota) that particular sector will close for the remainder of the fishing year. In addition to these measures, if recreational or commercial landings exceed their respective annual catch limit (ACL), the ACT (quota) and the ACL for that individual sector will be reduced for the following fishing year by the amount of the overage in the prior fishing year.

While National Marine Fisheries (NMFS) does not require a recreational permit for private angling of reef fish in federal waters of the Gulf, each state requires their own recreational fishing license while in their respective state waters. A federal charter/headboat (for-hire) vessel permit has been required for reef fish since 1996 and the sector currently operates under a limited access system (GMFMC 2005b). As of July 10, 2017, there were 1,311 vessels with a valid (non-expired) or renewable Gulf for-hire reef fish permit (including historical captain permits). A commercial reef fish permit has been required since 1990 (GMFMC 1989). This permit is currently a limited access permit. As of July 10, 2017, a total of 839 vessels possess a reef fish commercial permit (788 valid and 51 renewable/transferable). Approximately 98% of the permits list a mailing recipient in a Gulf state.

In the commercial sector, greater amberjack are predominantly harvested by hook-and-line. Landings were less than 300,000 lbs until 1983, but since then have increased annually with a peak landing of 1,730,386 million pounds (mp) in 1992 and declining thereafter. Landings further declined from 1998-1999, which can be attributed to an annual Gulf-wide closure that

was implemented for the commercial fishery during the months of March, April and May in 1998. Another decline was occurred in 2012, which can be attributed to a reduction in the ACL in 2012 and beyond although declines were already in progress before that, most likely attributed to the 2010 *Deepwater Horizon MC252* oil spill. Recent records show landings at half of what they once were historically (Figure 3.1.1). The commercial sector has not had a year-round fishing season for greater amberjack since 2008. Commercial harvest reached its quota before the end of the 2009 season and in every subsequent fishing year since.

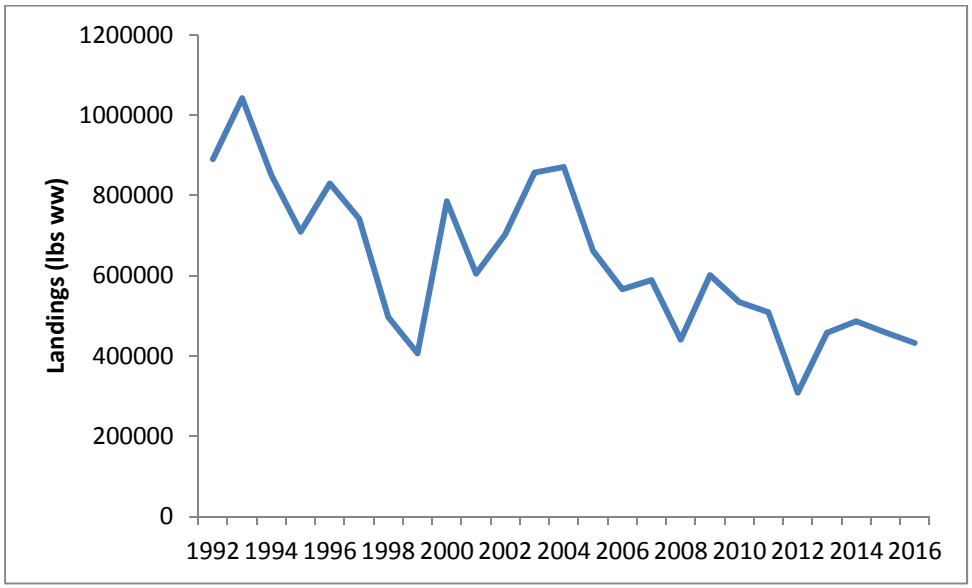

Figure 3.1.1. Commercial landings (lbs ww) of greater amberjack from 1992 through 2016.
Source: SEFSC recreational (6/7/2017) ACL datasets.

Recreational greater amberjack are predominantly harvested by handlines. Landings peaked in 1986 at approximately 7.5 mp, but have been well below this level in subsequent years. Recreational landings from 1992 through 2016 averaged approximately 1.5 mp (Figure 3.1.2.1). Declines can be seen starting in 2010 and into 2011 for the private angler, which can be possibly be attributed to the 2010 *Deepwater Horizon MC252* oil spill, and for both the private and for-hire anglers beginning in 2014. This can be attributed to a reduction of the ACL and ACT as well as an accountability measure that requires a closure when that recreational quota is met or projected to be met, and a payback occurring the following year if the ACL is exceeded. While accountability measures require the closure of the fishing season when the recreational quota is met or projected to be met, the date when this will occur is not always easily predicted. The 2017 recreational fishing season was shorter than expected due to the large quota overage in 2016. The recreational season for greater amberjack has not been open for the full fishing year since 2013. Fishing years have gotten progressively shorter since this time. The shortest recreational season to date occurred in 2017 leading recreational anglers to ask for a change in the fixed closed season allowing for not only an extended season, but a spring and a fall season.

For the years 1992-2016, the private angler fishing mode has accounted for approximately 48% of total recreational landings of greater amberjack, followed by charter boats (45%) and headboats (7%). From 2010-2016, Florida and Alabama accounted for 88.8% of greater amberjack recreational landings.

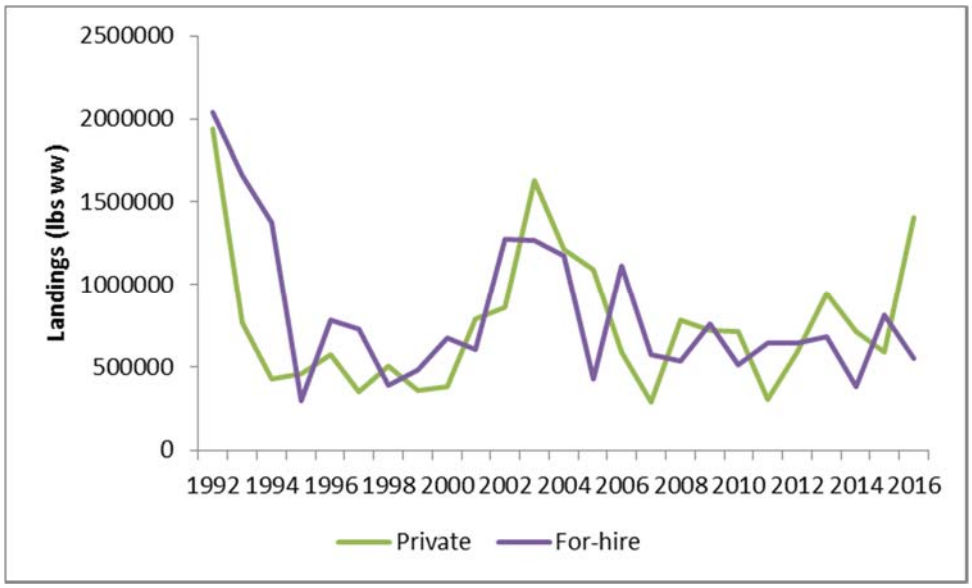

Figure 3.1.2. Recreational private and for-hire landings (lbs ww) of greater amberjack from 1992 through 2016. Recreational landings were estimate from the Marine Recreational Information Program, Texas Parks and Wildlife Department, Louisiana Creel, and Southeast Region Headboat Survey.
Source: SEFSC recreational (6/7/2017) ACL datasets.

3.2 Description of the Physical Environment

The physical environment for Gulf reef fish is detailed in the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2004a), Generic Amendment 3 (GMFMC 2005a), and the Generic ACL/ AM Amendment (GMFMC 2011), which are hereby incorporated by reference.

The Gulf has a total area of approximately 600,000 square miles (1.5 million km^2), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.2.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechhelm 2005). Mean annual sea surface temperatures ranged from 73 through 83º F (23-28º C) including bays and bayous (Figure 3.2.1) between 1982 and 2009, according to satellite-derived measurements (NODC 2012: http://accession.nodc.noaa.gov/0072888). In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

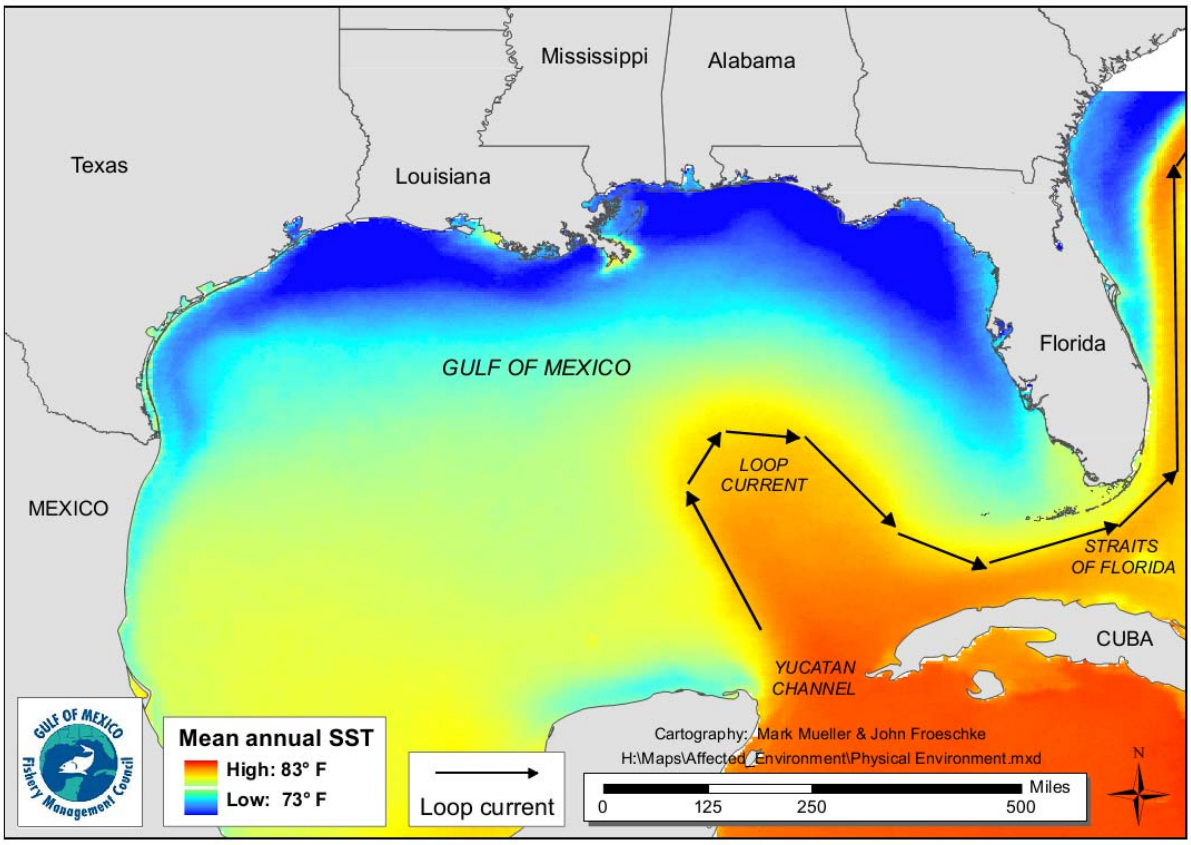

Figure 3.2.1. Mean annual sea surface temperature derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://pathfinder.nodc.noaa.gov).

Habitat Areas of Particular Concern (HAPC) and Environmental Sites of Special Interest Relevant to Reef Fish, Red Drum, Coastal Migratory Pelagics, and Red Drum.

Multiple areas closed to fishing entirely or closed during certain times of the year to specific gear types. These areas were identified in the Gulf to provide protection for various, economically important reef fish species (Figure 3.2.2).

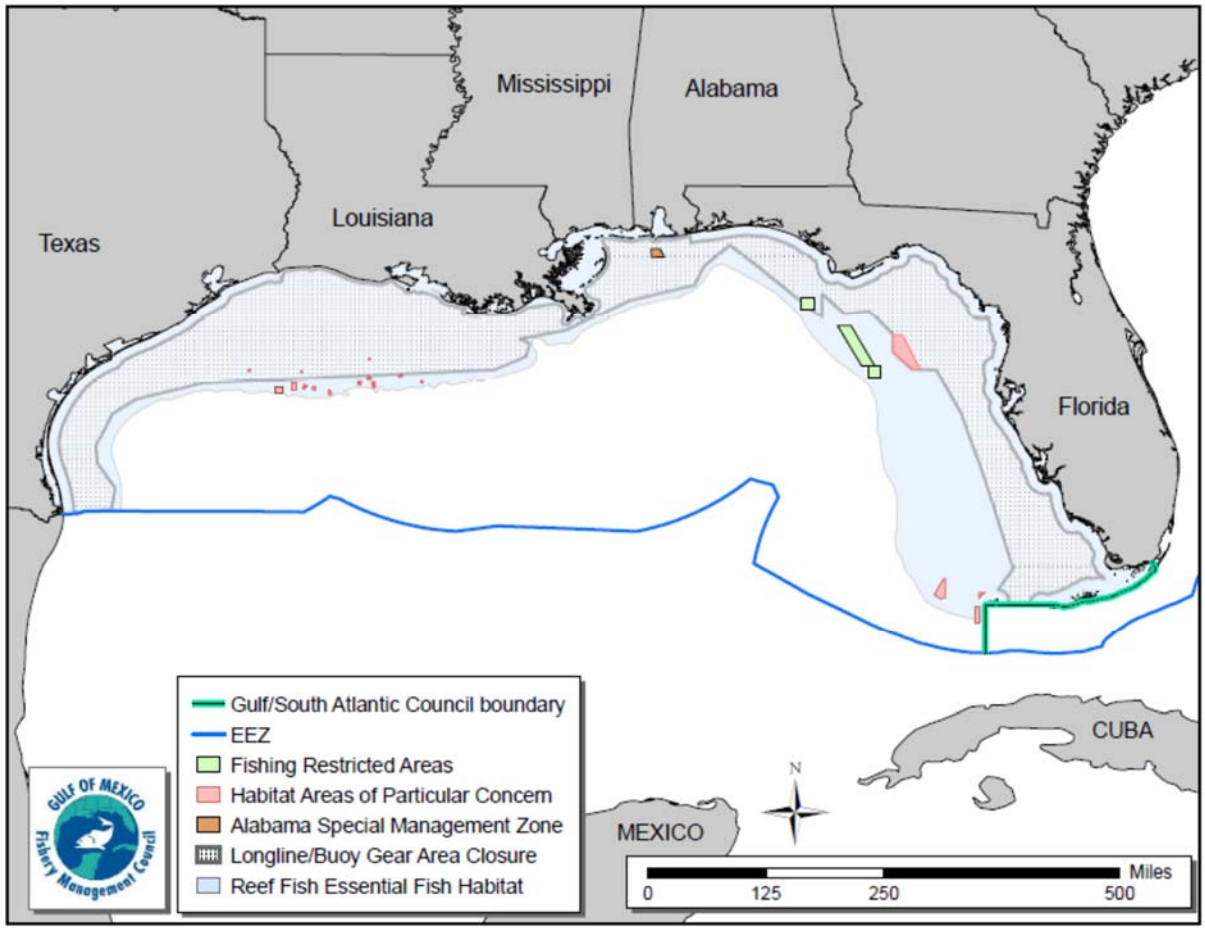

Figure 3.2.2. Map of most fishery management closed areas in the Gulf of Mexico.

Deepwater Horizon MC252

The *Deepwater Horizon MC252* oil spill in 2010 affected at least one-third of the Gulf area from western Louisiana east to the Florida Panhandle and south to the Campeche Bank in Mexico. The impacts of the *Deepwater Horizon MC252* oil spill on the physical environment are expected to be significant and may be long-term. Oil was dispersed on the surface, and because of the heavy use of dispersants (both at the surface and at the wellhead), oil was also documented as being suspended within the water column, some even deeper than the location of the broken well head. Floating and suspended oil washed onto shore in several areas of the Gulf as were non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are persistent in the environment and can be transported hundreds of miles. Oil on the surface of the water could restrict the normal process of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column. In addition, microbes in the water that break down oil and dispersant also consume oxygen; this could lead to further oxygen depletion. It is also possible that zooplankton that feed on algae could be negatively impacted, thus allowing more of the hypoxia-fueling algae to grow.

3.3 Description of the Biological/Ecological Environment

A more complete description of the biological/ecological environment can be found in Chapter 3 of Framework to the Reef Fish FMP for modifications to greater amberjack allowable harvest and rebuilding plan (GMFMC 2017). That description is summarized in the following sections and incorporated herein by reference.

Greater Amberjack Life History and Biology

Seasonal aspects of reproduction

Studies conducted in the Gulf have estimated that peak spawning occurs during the months of March and April (Wells and Rooker 2002; Murie and Parkyn 2008). There is also evidence for separate and limited connectivity of the greater amberjack population structure within the Gulf, where the northern Gulf population does not appear to mix often with the Florida Keys population (Gold and Richardson 1998, Murie et al. 2011).

Early studies on greater amberjack conducted in south Florida indicated that maximum gonad development occurred in the spring months (Burch 1979) although larvae and small juveniles were reported year round in the entire Gulf (Aprieto 1974). Harris et al. (2007) provided information on reproduction in the southeastern U.S. Atlantic using fishery-dependent and fishery-independent samples from 2000 - 2004. Greater amberjack in spawning condition were captured from North Carolina to the Florida Keys; however, spawning was concentrated in areas off south Florida and the Florida Keys. Harris et al. (2007) documented evidence of spawning from January - June with peak spawning during April and May within this area. They estimated a spawning season of approximately 73 days off south Florida, with a spawning period of 5 days, and that an individual female could spawn as frequently as 14 times during the season. Wells and Rooker (2002) conducted studies in the northwestern Gulf on larval and juvenile fish associated with floating *Sargassum* spp. Based on the size and season when larvae and juvenile greater amberjack were captured, they suggested peak spawning season occurred in March and April although they did find that peak spawning began as early as February off Texas. Murie and Parkyn (2008) provided updated information on reproduction of greater amberjack throughout the Gulf using fishery-dependent as well as fishery-independent data from 1989-2008 (it is important to note that fishery-dependent sampling has not been year round). They reported peak spawning occurring during March and April, and by May, they documented low gonad weights indicating spawning was ending.

Status of the Greater Amberjack Stock

See Section 1.1 Background.

Bycatch

Details of bycatch in the greater amberjack fishery can be found in Appendix C (Bycatch Practicability Analysis) of Framework to the Reef Fish FMP to modify greater amberjack allowable harvest and rebuilding plan (GMFMC 2017), and is hereby incorporated by reference. In summary, studies have documented low bycatch and bycatch mortality of finfish due to the ability for fishermen to specifically target schools of greater amberjack when the season is open and avoid them during times of closure. Other reef fish species known to be incidentally caught include almaco jack, vermillion snapper and some deep-water groupers. None of these species are currently undergoing overfishing although the overfished status of almaco jack and deep-water groupers is unknown (NMFS 2016 Summary of Stock Status for Federal Strategic Sourcing Initiative [FSSI]). Minimum size limits are estimated to be the greatest source of regulatory discards for the majority of reef fish species. The greater amberjack recreational sector is currently constrained to a 34-inch FL minimum size limit while the commercial sector is constrained to a 36-inch FL minimum size limit. Bag limits can also play a part in bycatch, although not as significant a role as size limits. Due to the ability for fishermen to be selective of greater amberjack, very little bycatch of target or non-target species is expected in the greater amberjack fishery. Interactions with other species such as sea turtles and sea birds are known to occur, but are minimal (see next section).

This amendment considers management measures that are expected to affect greater amberjack discard mortality due to changing the recreational closed season. Discard mortality increase for reef fish has been positively correlated with warmer water temperatures (Pulver 2017), of which, proposed alternatives have the season being closed during these times. While general discard mortality for greater amberjack has been found to be variable and at times high (Stephen and Harris 2010), Murie and Parkyn (2008) found that release mortality for greater amberjack was not affected by capture depth and rates were less than the assumed release mortality used in the SEDAR 33 stock assessment. In any case, discards are anticipated to be minimal due to fishermen being able to avoid schools of greater amberjack during closed seasons.

Protected Species

The Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) provide special protections to some species that occur in the Gulf. A very brief summary of these two laws and more information is available on NMFS Office of Protected Resources website (http://www.nmfs.noaa.gov/pr/laws/). All 22 marine mammals in the Gulf are protected under the MMPA. Two marine mammals (sperm whales and manatees) are also protected under the ESA. Other species protected under the ESA include sea turtle species (Kemp's ridley, loggerhead (Northwest Atlantic Ocean distinct population segment [DPS]), green (South Atlantic and North Atlantic DPSs), leatherback, and hawksbill), three fish species (Gulf sturgeon, smalltooth sawfish, and Nassau grouper), and six coral species (elkhorn, staghorn, lobed star, mountainous star, pillar, and boulder star). Critical habitat designated under the ESA for smalltooth sawfish, Gulf sturgeon, and the Northwest Atlantic Ocean DPS of loggerhead sea turtles also occur in the Gulf, though only loggerhead critical habitat occurs in federal waters.

The most recent biological opinion (opinion) on the Reef Fish FMP was completed on September 30, 2011 (NMFS 2011). The opinion determined the continued authorization of the Gulf reef fish fishery managed under the Reef Fish FMP is not likely to affect ESA-listed marine mammals or corals, and is not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback), or smalltooth sawfish. An incidental take statement was provided. Since issuing the opinion, in memoranda dated September 16, 2014, and October 7, 2014, NMFS concluded that the activities associated with the Reef Fish FMP are not likely to adversely affect critical habitat for the Northwest Atlantic Ocean loggerhead sea turtle DPS or four species of corals (*Mycetophyllia ferox*, *Orbicella annularis*, *O. faveolata*, and *O. franksi*).

On April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population ESA-listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered, effective May 6, 2016. Two of the green sea turtle DPSs, the North Atlantic DPS and the South Atlantic DPS, occur in the Gulf and are listed as threatened. In addition, on June 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA. NMFS has reinitiated consultation on the Reef Fish FMP to address these listings and in a memorandum dated September 29, 2016, NMFS determined that allowing fishing under the Reef Fish FMP to continue during the reinitiation period is not likely to jeopardize the continued existence of the North Atlantic and South Atlantic DPSs of green sea turtles or Nassau grouper. Bryde's whales are the only resident baleen whales in the Gulf and are currently being evaluated to determine if listing under the ESA is warranted (81 FR 88639; December 8, 2016).

There is no information to indicate marine mammals and birds rely on greater amberjack for food, and they are not generally caught by fishers harvesting greater amberjack. Primary gears of the Gulf reef fish fishery are classified in the List of Fisheries for 2017 (82 FR 3655) as Category III gear. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population. The current reef fish opinion, along with subsequent memos, have concluded that the continued operation of the Gulf reef fish fishery is not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback), smalltooth sawfish (NMFS 2011), newly listed coral species, newly designated loggerhead critical habitat, listed green turtle distinct population segments, or Nassau grouper. Additionally, there is no evidence that the directed greater amberjack fishery is adversely affecting seabirds.

Northern Gulf of Mexico Hypoxic Zone

Every summer in the northern Gulf, a large hypoxic zone forms. It is the result of allochthonous materials and runoff from agricultural lands by rivers to the Gulf, increasing nutrient inputs from the Mississippi River, and a seasonal layering of waters in the Gulf. The layering of the water is

temperature and salinity dependent and prevents the mixing of higher oxygen content surface water with oxygen-poor bottom water. For 2014, the extent of the hypoxic area was estimated to be 5,052 square miles and is similar the running average for over the past five years of 5,543 square miles Gulf (see http://www.gulfhypoxia.net/). The hypoxic conditions in the northern Gulf directly impact less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009). However, more mobile macroinvertebrates and demersal fishes (e.g., red snapper) are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, although not directly affected, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Climate change

Climate change projections predict increases in sea-surface temperature and sea level; decreases in sea-ice cover; and changes in salinity, wave climate, and ocean circulation (Intergovernmental Panel on Climate Change [IPCC] http://www.ipcc.ch/). These changes are likely to affect plankton biomass and fish larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. Kennedy et al. (2002) and Osgood (2008) have suggested global climate change could affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The National Oceanic and Atmospheric Association (NOAA) Climate Change Web Portal[1] predicts the average sea surface temperature in the Gulf will increase by 1.2-1.4ºC for 2006-2055 compared to the average over the years 1956-2005. For reef fishes, Burton (2008) speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. It is unclear if reef fish distribution in the Gulf has been affected.

The distribution of native and exotic species may change with increased water temperature, as may the prevalence of disease in keystone animals such as corals and the occurrence and intensity of toxic algae blooms. Hollowed et al. (2013) provided a review of projected effects of climate change on the marine fisheries and dependent communities. Integrating the potential effects of climate change into the fisheries assessment is currently difficult due to the time scale differences (Hollowed et al. 2013). The fisheries stock assessments rarely project through a time span that would include detectable climate change effects.

Greenhouse gases

The IPCC (http://www.ipcc.ch/) has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2014) inventoried the sources of

[1] Source: https://www.esrl.noaa.gov/psd/ipcc/

greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.3.1 with respect to total emissions and from fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (1.43% and 0.59%, respectively).

Table 3.3.1. Total Gulf greenhouse gas emissions estimates (tons per year) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions*.

Emission source	CO_2	Greenhouse CH_4	Gas N_2O	Total CO_{2e}**
Oil platform	11,882,029	271,355	167	17,632,106
Non-platform	22,703,695	2,029	2,698	23,582,684
Total	34,585,724	273,384	2,865	41,214,790
Commercial fishing	585,204	2	17	590,516
Percent commercial fishing	1.69	>0.01	0.59	1.43

*Compiled from Tables 7.9 and 7.10 in Wilson et al. (2014).

**The CO_2 equivalent (CO_{2e}) emission estimates represent the number of tons of CO_2 emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH_4 and N_2O). Conversion factors to CO_{2e} are 21 for CH_4 and 310 for N_2O.

Deepwater Horizon MC252 Oil Spill

General Impacts on Fishery Resources

The presence of polyaromatic hydrocarbons (PAH), which are highly toxic chemicals that tend to persist in the environment for long periods of time, in marine environments can have detrimental impacts on marine finfish, especially during the more vulnerable larval stage of development (Whitehead et al. 2011). When exposed to realistic, yet toxic levels of PAHs (1–15 µg/L), greater amberjack larvae develop cardiac abnormalities and physiological defects (Incardona et al. 2014). The future reproductive success of long-lived species, including red drum (*Sciaenops ocellatus*) and many reef fish species, may be negatively affected by episodic events resulting in high-mortality years or low recruitment. These episodic events could leave gaps in the age structure of the population, thereby affecting future reproductive output (Mendelssohn et al. 2012). Other studies have described the vulnerabilities of various marine finfish species, with morphological and/or life history characteristics similar to species found in the Gulf, to oil spills and dispersants (Hose et al. 1996; Carls et al. 1999; Heintz et al. 1999; Short 2003).

Increases in histopathological lesions were found in red snapper (*Lutjanus campechanus*) in the area affected by the oil, but Murawski et al. (2014) found that the incidence of lesions had declined between 2011 and 2012. The occurrence of such lesions in marine fish is not

uncommon (Sindermann 1979; Haensly et al. 1982; Solangi and Overstreet 1982; Khan and Kiceniuk 1984, 1988; Kiceniuk and Khan 1987; Khan 1990). Red snapper diet was also affected after the spill. A decrease in zooplankton consumed, especially by adults (greater than 400 mm total length) over natural and artificial substrates may have contributed to an increase in the consumption of fish and invertebrate prey – more so at artificial reefs than natural reefs (Tarnecki and Patterson 2015).

In addition to the crude oil, over a million gallons of the dispersant, Corexit 9500A®, was applied to the ocean surface and an additional hundreds of thousands of gallons of dispersant was pumped to the mile-deep well head (National Commission 2010). No large-scale applications of dispersants in deep water had been conducted until the *Deepwater Horizon MC252* oil spill. Thus, no data exist on the environmental fate of dispersants in deep water. The effect of oil, dispersants, and the combination of oil and dispersants on fishes of the Gulf remains an area of concern. Marine fish species typically concentrate PAHs in the digestive tract, making stomach bile an appropriate testing medium. A study by Synder et al. (2015) assessed bile samples from golden tilefish (*Lopholatilus chamaeleonticeps*), king snake eel (*Ophichthus rex*), and red snapper for PAH accumulation over time, and reported concentrations were highest in golden tilefish during the same time period when compared to king snake eel and red snapper. These results suggest that the more highly associated an organism is with the sediment in an oil spill area, the higher the likelihood of toxic PAH accumulation. Twenty-first century dispersant applications are thought to be less harmful than their predecessors. However, the combination of oil and dispersants has proven to be more toxic to marine fishes than either dispersants or crude oil alone. Marine fish which are more active (e.g., a pelagic species versus a demersal species) appear to be more susceptible to negative effects from interactions with weathered oil/dispersant emulsions. These effects can include mobility impairment and inhibited respiration (Swedmark et al. 1973). Another study found that while Corexit 9500A® and oil are similar in their toxicity, when Corexit 9500A® and oil were mixed in lab tests, toxicity to microscopic rotifers increased up to 52-fold (Rico-Martínez et al. 2013). These studies suggest that the toxicity of the oil and dispersant combined may be greater than anticipated.

As reported by NOAA's Office of Response and Restoration (NOAA 2010), the oil from the *Deepwater Horizon MC252* spill is relatively high in alkanes, which can readily be used by microorganisms as a food source (Figure 3.3.1). As a result, the oil from this spill is likely to biodegrade more readily than crude oil in general. The *Deepwater Horizon MC252* oil is also relatively much lower in PAH, especially if the spilled oil penetrates into the substrate on beaches or shorelines. Like all crude oils, MC252 oil contains volatile organic compounds (VOCs) such as benzene, toluene, and xylene. Some VOCs are acutely toxic but because they evaporate readily, they are generally a concern only when oil is fresh.[2]

[2] Source: http://sero.nmfs.noaa.gov/deepwater_horizon/documents/pdfs/fact_sheets/oil_characteristics.pdf

Outstanding Effects

As a result of the *Deepwater Horizon MC252* oil spill, a consultation pursuant to ESA Section 7(a)(2) was reinitiated. As discussed above, on September 30, 2011, the Protected Resources Division released an opinion, which after analyzing best available data, the current status of the species, environmental baseline (including the impacts of the recent *Deepwater Horizon MC252* oil spill in the northern Gulf), effects of the proposed action, and cumulative effects, concluded that the continued operation of the Gulf reef fish fishery is not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles, nor the continued existence of smalltooth sawfish (NMFS 2011). For additional information on the *Deepwater Horizon MC252* oil spill and associated closures, see: http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm.

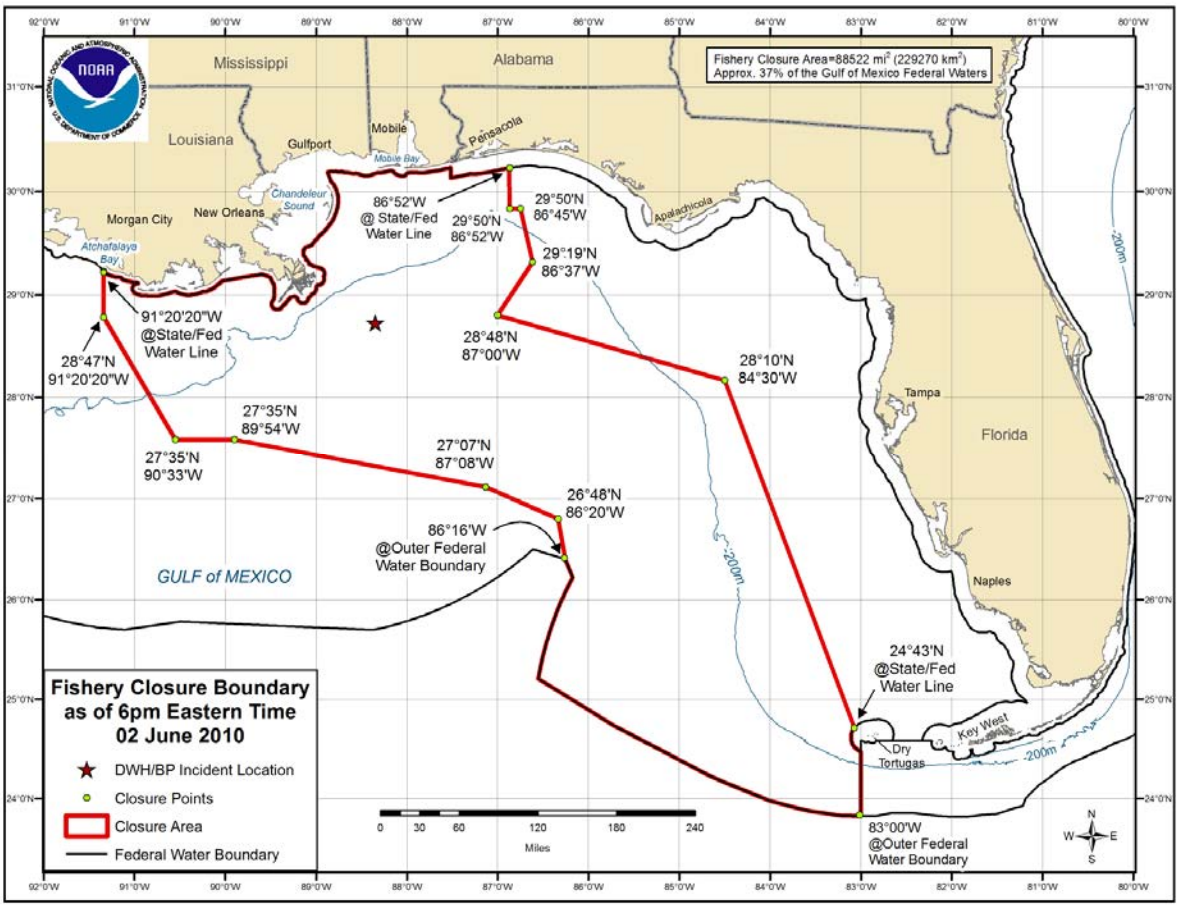

Figure 3.3.1. Fishery closure at the height of the *Deepwater Horizon MC252* oil spill

3.4 Description of the Economic Environment

3.4.1 Commercial Sector

Vessel Activity

Tables 3.4.1.1 and 3.4.1.2 contain information on vessel performance for commercial vessels that harvested greater amberjack in the Gulf during 2012-2015. The tables contain vessel counts from the NMFS Southeast Fisheries Science Center (SEFSC) logbook (logbook) data (vessel count, trips, and landings). Dockside values were generated using landings information from logbook data and price information from the NMFS SEFSC Accumulated Landings System (ALS) data. The data in Tables 3.4.1.1 – 3.4.1.2 cover all vessels that harvested greater amberjack anywhere in the Gulf, regardless of trip length or species target intent.

Landings shown in Tables 3.4.1.1 – 3.4.1.2 are based on logbook information for landings and NMFS ALS for prices (SEFSC-Social Science Research Group (SSRG) Economic Panel Data). Thus, these landings would not exactly match with greater amberjack landings shown in Table 1.1.4 which are based on SEFSC ACL databases. In addition, the landings are presented in gutted weight rather than whole weight. Landings for all species in the SEFSC-SSRG Economic Panel Data are expressed in gutted weight to provide one unit for all species, because data summarizations as done in Tables 3.4.1.1-3.4.1.2 involve a multitude of species. Federally permitted vessels required to submit logbooks generally report their harvest of most species regardless of whether the fish were caught in state or federal waters.

On average, 185 vessels per year landed greater amberjack in the Gulf. These vessels, combined, averaged 522 trips per year in the Gulf on which greater amberjack was landed and 2,935 other trips (Table 3.4.1.1). The average annual total dockside revenue (2015 dollars) was approximately $0.54 million from greater amberjack, approximately $4.44 million from other species co-harvested with greater amberjack (on the same trips), and approximately $26.75 million from other trips by these vessels on trips in the Gulf on which no greater amberjack were harvested or occurred in the South Atlantic. Total average annual revenue from all species harvested by vessels harvesting greater amberjack in the Gulf was approximately $31.74 million, or approximately $171,971 per vessel (Table 3.4.1.2).

Table 3.4.1.1. Summary of vessel counts, trips, and landings (pounds (lbs) gutted weight (gw)) for vessels landing at least one pound of greater amberjack, 2012-2016.

Year	Number of Vessels	Number of Gulf Trips that Landed Greater Amberjack	Greater Amberjack Landings (lbs gw)	"Other Species" Landings Jointly Caught with Greater Amberjack (lbs gw)	Number of Other Trips*	Landings on Other Trips (lbs gw)
2012	142	314	270,223	692,299	2,458	5,698,213
2013	184	501	359,316	1,160,832	2,707	7,125,886
2014	221	718	427,543	1,794,266	3,459	8,726,053
2015	185	554	400,548	1,364,588	3,025	8,668,384
2016	207	692	395,146	1,622,322	3,458	8,684,524
Average	188	556	370,555	1,326,861	3,021	7,780,612

Source: NMFS SEFSC Economic Query System, March 7, 2017.
*Includes Gulf trips on which greater amberjack were not harvested as well as trips in the South Atlantic regardless of what species were harvested, including greater amberjack

Table 3.4.1.2. Summary of vessel counts and revenue (2016 dollars) for vessels landing at least one pound of greater amberjack, 2012-2016.

Year	Number of Vessels	Dockside Revenue from Gulf Greater Amberjack	Dockside Revenue from "Other Species" Jointly Caught with Greater Amberjack	Dockside Revenue on Other Trips	Total Dockside Revenue	Average Total Dockside Revenue per Vessel
2012	142	$354,982	$2,235,140	$18,844,213	$21,434,335	$150,946
2013	184	$547,335	$4,349,319	$26,890,810	$31,787,464	$172,758
2014	221	$654,830	$6,763,125	$33,334,752	$40,752,707	$184,401
2015	185	$615,974	$5,439,297	$34,240,589	$40,295,860	$217,815
2016	207	$679,463	$6,484,081	$34,366,293	$41,529,837	$200,627
Average	188	$570,517	$5,054,192	$29,535,331	$35,160,041	$185,310

Source: NMFS SEFSC Economic Query System, March 7, 2017.

Ex-vessel Prices

The dockside or ex-vessel price is the price the vessel receives at the first sale of harvest. Over the period 2012-2016, the average annual ex-vessel price per pound for greater amberjack harvested in the Gulf was $1.54 (2016 dollars), and ranged from $1.31 in 2010 to $1.72 in 2016.

Commercial Sector Business Activity

Estimates of the business activity (economic impacts) in the U.S. associated with the Gulf greater amberjack commercial harvests were derived using the model developed for and applied in NMFS (2015) and are provided in Table 3.4.1.3. Business activity for the commercial sector is characterized in the form of full-time equivalent (FTE) jobs, output (sales) impacts (gross business sales), income impacts (wages, salaries, and self-employed income), and value added impacts (difference between the sales price of a good and the cost of the goods and services needed to produce it). Income impacts should not be added to output (sales) impacts because this would result in double counting. The estimates of economic activity include the direct effects (effects in the sector where an expenditure is actually made), indirect effects (effects in sectors providing goods and services to directly affected sectors), and induced effects (effects induced by the personal consumption expenditures of employees in the direct and indirectly affected sectors).

Table 3.4.1.3. Average revenue and annual business activity associated with the harvests of vessels that harvested greater amberjack in the Gulf. Dollar values are in thousand 2016 dollars.

Species	Average Annual Dockside Revenue	Jobs	Output (Sales) Impacts	Income Impacts	Value Added Impacts
Greater Amberjack	$570	76	$5,658	$2,078	$2,936
All species*	$35,160	4,694	$348,675	$128,046	$180,914

*Includes dockside revenues and economic activity associated with the average annual harvest of all species, including greater amberjack, harvested by vessels that harvested greater amberjack in the Gulf. Source: Revenue data from NMFS SEFSC Logbook and ALS data, economic impact results calculated by NMFS Southeast Regional Office (SERO) using the model developed for NMFS (2015).

In addition to the business activities generated by commercial vessel landings of greater amberjack, business activities associated with commercial vessel landings of all other species landed by commercial vessels are also presented in the tables above. Vessels that harvested greater amberjack also harvested other species on trips where greater amberjack were harvested, and some took other trips in the Gulf on which no greater amberjack were harvested, as well as trips in the South Atlantic. All revenues from all species harvested on all of these trips contributed towards making these vessels economically viable and contribute to the economic activity associated with these vessels.

Dealers

Commercial vessels landing greater amberjack can only sell their catch to seafood dealers with valid Gulf and South Atlantic Dealer (GSAD) permit. On September 2, 2017, there were 428 dealers with a valid GSAD permit. There are no income or sales requirements to acquire a GSAD permit. As a result, the total number of dealers can vary over the course of the year and from year to year.

Imports

Information on the imports of all snapper and grouper species, either fresh or frozen, are available at: http://www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataProduct.html. Information on the imports of individual snapper or grouper species, including greater amberjack, is not available. In 2016, imports of all snapper and grouper species (fresh and frozen) were approximately 57.20 million pounds (mp) valued at approximately $176.86 million (2016 dollars). These amounts are contrasted with the harvest of all reef fish in the Gulf in 2016 of approximately 14.59 mp valued at approximately $54.94 million (2016 dollars; data available at: http://www.st.nmfs.noaa.gov/commercial-fisheries/publications/index). Although the levels of domestic production and imports are not totally comparable for several reasons, including considerations of different product form such as fresh versus frozen, and possible product mislabeling, the difference in the magnitude of imports relative to the amount of domestic harvest is indicative of the dominance of imports in the domestic market. Final comparable data for more recent years are not currently available.

3.4.2 Recreational Sector

Angler Effort

Recreational effort derived from the Marine Recreational Information Program (MRIP) database can be characterized in terms of the number of trips as follows:

- Target effort – The number of individual angler trips, regardless of duration, where the intercepted angler indicated that the species or a species in the species group was targeted as either the first or second primary target for the trip. The species did not have to be caught.
- Catch effort – The number of individual angler trips, regardless of duration and target intent, where the individual species or a species in the species group was caught. The fish did not have to be kept.
- Total recreational trips – The total estimated number of recreational trips in the Gulf, regardless of target intent or catch success.

Other measures of effort are possible, such as directed trips (the number of individual angler trips that either targeted or caught a particular species). Estimates of the number of greater amberjack target trips and catch trips for the shore, charter, and private/rental boat modes in the Gulf for

2011-2016 are provided in Table 3.4.2.1. Only Florida recorded greater amberjack target trips for the shore mode. Over the period examined, greater amberjack were most commonly targeted by private/rental anglers, and average greater amberjack target effort totaled approximately 63,000 trips per year across all modes (Table 3.4.2.1). As shown in Table 3.4.2.1, considerably more trips caught greater amberjack, approximately 155,000 trips from all modes, than targeted greater amberjack, but the private/rental mode remains the dominant mode. Florida is the dominant state in both target and catch effort for each mode.

Table 3.4.2.1. Average number of greater amberjack recreational target and catch trips, by mode, by state, 2012-2016*.

	Shore Mode	Charter Mode	Private/Rental Mode	All Modes
Target Trips				
Alabama	nr	1,782	10,339	12,122
Florida	2,789	7,397	33,326	43,511
Mississippi	nr	nr	3,255	3,255
Louisiana	nr	1,041	2,861	3,902
Total	2,789	10,220	49,781	62,790
Catch Trips				
Alabama	1,449	8,017	11,440	19,747
Florida	1,421	42,678	74,839	118,370
Mississippi	nr	nr	2,043	2,043
Louisiana	nr	4,181	5,960	10,141
Total	2,870	54,876	94,283	150,301

Source: MRIP database, NMFS, SERO.
*"nr" = none recorded. Averages based on positive entries; "nr" entries are not assumed equivalent to "0" trips; Texas is not covered in the MRFSS/MRIP, so no target or catch trips are available for the state. Louisiana data from 2014 to present are collected through LA Creel and not available in the MRIP database.

Similar analysis of recreational effort is not possible for the headboat mode because headboat data are not collected at the angler level. Estimates of effort by the headboat mode are provided in terms of angler days, or the number of standardized 12-hour fishing days that account for the different half-, three-quarter-, and full-day fishing trips by headboats. The stationary "fishing for demersal (bottom-dwelling) species" nature of headboat fishing, as opposed to trolling, suggests that most, if not all, headboat trips and, hence, angler days, are demersal or reef fish trips by intent. Estimates of headboat effort (angler days) are provided in Table 3.4.2.2. Headboat data are collected by the NMFS Southeast Region Headboat Survey (SRHS).

Table 3.4.2.2. Headboat angler days and percent distribution, by state, 2011-2015.

	Angler Days				Percent Distribution			
	FLW	NWFL-AL*	MS-LA**	TX	FLW	FL-AL	MS-LA	TX
2012	84,205	77,770	3,680	51,776	38.7%	35.8%	1.7%	23.8%
2013	94,752	80,048	3,406	55,749	40.5%	34.2%	1.5%	23.8%
2014	102,841	88,524	3,257	51,231	41.8%	36.0%	1.3%	20.8%
2015	107,910	86,473	3,587	55,135	42.6%	34.2%	1.4%	21.8%
2016	109,098	90,875	2,952	54,077	42.5%	35.4%	1.1%	21.0%
Average	99,761	84,738	3,376	53,594	41.3%	35.1%	1.4%	22.2%

Source: NMFS Southeast Region Headboat Survey (SRHS).

*Beginning in 2013, headboat data were reported separately for NW Florida and Alabama, but has been combined here for consistency with previous years. **Headboats from MS and LA are combined for confidentiality purposes.

Permits

The for-hire sector is comprised of charter vessels and headboats (party boats). Although charter vessels tend to be smaller, on average, than headboats, the key distinction between the two types of operations is how the fee is determined. On a charter boat trip, the fee charged is for the entire vessel, regardless of how many passengers are carried, whereas the fee charged for a headboat trip is paid per individual angler.

A federal charter/headboat (for-hire) vessel permit is required for fishing in federal waters for Gulf reef fish. On September 2, 2017, there were 1,310 vessels with a valid (non-expired) or renewable Gulf for-hire reef fish permit (including historical captain permits). A renewable permit is an expired limited access permit that may not be actively fished, but is renewable for up to one year after expiration. The Gulf reef fish for-hire permits are limited access permits. Most for-hire vessels possess more than one for-hire permit.

Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel and vessels may operate in both capacities. However, if a vessel meets certain selection criteria used by the SRHS and is selected to report by the Science Research Director (SRD) of the SEFSC, it is determined to operate primarily as a headboat and is required to submit harvest and effort information to the SRHS. As of February 2017, 73 Gulf headboats were registered in the SRHS (K. Fitzpatrick, NMFS SEFSC, pers. comm.).

Information on Gulf charter vessel and headboat operating characteristics is included in Savolainen et al. (2012) and is incorporated herein by reference. The average charter vessel operation took 46 full-day (9 hours) and 55 half-day (5 hours) trips per year, carried 4.8 and 4.6 passengers per trip type, respectively, targeted reef fish and pelagic species on 64% and 19% of all trips, respectively, and took 68% of all trips in the EEZ. The average headboat operation took

83 full-day (10 hours) and 37 half-day (6 hours) trips per year, carried 13.1 and 14.6 passengers per trip type, respectively, targeted reef fish and pelagic species on 84% and 6% of all trips, respectively, and took 81% of all trips in the EEZ.

There are no specific federal permitting requirements for recreational anglers to fish for or harvest reef fish. Instead, anglers are required to possess either a state recreational fishing permit that authorizes saltwater fishing in general, or be registered in the federal National Saltwater Angler Registry system, subject to appropriate exemptions. For the for-hire sector, customers are authorized to fish under the charter or headboat vessel license and are not required to hold their own fishing licenses. As a result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this amendment.

Economic Value

Economic value can be measured in the form of consumer surplus (CS) per additional fish kept on a trip for anglers (the amount of money that an angler would be willing to pay for a fish in excess of the cost to harvest the fish). The CS value per fish for greater amberjack is unknown but a proxy may be used to approximate the CS per fish. Haab et al. (2012) estimated a CS for an additional snapper caught and kept of $12.25 (2016 dollars), with bounds of $8.17 and $17.69 at the 95 percent confidence interval.

Economic value for for-hire vessels can be measured by producer surplus (PS) per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of the PS per for-hire passenger trip are not available. Instead, net operating revenue (NOR), which is the return used to pay all labor wages, returns to capital, and owner profits, is used as a proxy for PS. For vessels in the Gulf, the estimated NOR value is $155 (2016 dollars) per charter angler trip (Liese and Carter 2011). The estimated NOR value per headboat angler trip is $54 (2016 dollars) (C. Liese, NMFS SEFSC, pers. comm.).

Business Activity

Recreational fishing generates economic activity as consumers spend their income on various goods and services needed for recreational fishing. This spurs economic activity in the region where recreational fishing occurs. It should be clearly noted that, in the absence of the opportunity to fish, the income would presumably be spent on other goods and services and these expenditures would similarly generate economic activity in the region where the expenditure occurs. As such, the analysis below represents a distributional analysis only.

Estimates of the business activity (economic impacts) associated with recreational angling for greater amberjack were derived using average impact coefficients for recreational angling for all species, as derived from an add-on survey to the Marine Recreational Fisheries Survey and Statistics (MRFSS) to collect economic expenditure information, as described and utilized in NMFS (2015). Estimates of the average expenditures by recreational anglers are also provided in NMFS (2015) and are incorporated herein by reference.

Recreational fishing generates business activity (economic impacts). Business activity for the recreational sector is characterized in the form of full-time equivalent jobs, output (sales) impacts (gross business sales), income impacts, and value-added impacts (difference between the value of goods and the cost of materials or supplies). Estimates of the average greater amberjack target effort (2012-2016) and associated business activity (2016 dollars) are provided in Table 3.4.2.3. The average annual target effort for greater amberjack over the period 2012-2016 supported an estimated 51 jobs in Florida and generated approximately $6.1 million in output (sales) impacts, $3.4 million in value added impacts, and $2.1 million in income impacts. The corresponding numbers for the other states are: 15 jobs, $1.6 million in output impacts, $0.8 million in value added impacts, and $0.55 million in income impacts in Alabama; 1 job, $0.1 million in output impacts, $0.04 million in value added impacts, and $0.02 million in income impacts in Mississippi; 5 jobs, $0.7 million in output impacts, $0.4 million in value added impacts, and $0.2 million in income impacts in Louisiana.

Estimates of the business activity associated with headboat effort are not available. Headboat vessels are not covered by MRFSS/MRIP so, in addition to the absence of estimates of target effort, estimation of the appropriate business activity coefficients for headboat effort has not been conducted. For the same reason, estimation of business activity for Texas has not been conducted.

Table 3.4.2.3. Summary of greater amberjack target trips (2012-2016 average) and associated business activity (thousand 2016 dollars). Output, value added, and income impacts are not additive.

	Impacts			
	Florida	**Alabama**	**Mississippi**	**Louisiana**
	Shore Mode	**Shore Mode**	**Shore Mode**	**Shore Mode**
Target Trips	2,789			
Value Added Impact	$46			
Output Impact	$76			
Income Impact	$26			
Jobs	1			
	Private/Rental Mode	**Private/Rental Mode**	**Private/Rental Mode**	**Private/Rental Mode**
Target Trips	33,326	10,339	3,255	2,861
Value Added Impact	$735	$287	$46	$101
Output Impact	$1,240	$554	$106	$208
Income Impact	$426	$167	$27	$55
Jobs	11	6	1	1
	Charter Mode	**Charter Mode**	**Charter Mode**	**Charter Mode**
Target Trips	7,397	1,782		1,041
Value Added Impact	$2,659	$564		$324
Output Impact	$4,819	$1,081		$561
Income Impact	$1,736	$385		$218
Jobs	39	9		4
	All Modes	**All Modes**	**All Modes**	**All Modes**
Target Trips	43,512	12,121	3,255	3,902
Value Added Impact	$3,440	$851	$46	$425
Output Impact	$6,135	$1,635	$106	$769
Income Impact	$2,188	$552	$27	$272
Jobs	51	15	1	5

Source: Effort data from the MRIP, economic impact results calculated by 2016 NMFS SERO model.
Note: There currently are no comparable multipliers for Texas; empty impacts (cells) are due to the absence of recorded target trips for the specific fishing mode.

3.5 Description of the Social Environment

This framework action affects commercial and recreational management of greater amberjack in the Gulf. Commercial and recreational landings by state are included to provide information on the geographic distribution of fishing involvement. Descriptions of the top communities involved in commercial greater amberjack are included along with the top recreational fishing communities based on recreational engagement. Community level data are presented in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which requires the consideration of the importance of fishery resources to human communities when changes to fishing regulations are considered. Lastly, social vulnerability data are presented to assess the potential for environmental justice concerns.

3.5.1 Landings by State

The majority of greater amberjack landings are from the recreational sector in the Gulf (range of 59.6% to 81.2% from 2002-2016, Table 1.1.4). Within the recreational sector, the greatest proportion of landings are from private anglers (range of 31.9% to 71.8% from 2002 to 2016, Table 1.1.4) and charter vessels (range of 24.1% to 61.5%), followed by headboats (range of 1% to 8%).

Commercial

The greatest proportion of commercial greater amberjack landings are from waters adjacent to Florida (average of 49.6% from 2010-2016), followed by Louisiana and Texas, and Alabama and Mississippi (Table 3.5.1.1).

Table 3.5.1.1. Percentage of total commercial greater amberjack landings by state for 2010-2015.

Year	FL	AL/MS	LA/TX
2010	47.3%	3.0%	49.7%
2011	51.5%	1.8%	46.7%
2012	55.9%	5.4%	38.7%
2013	54.2%	5.6%	40.2%
2014	47.4%	17.2%	35.4%
2015	45.1%	19.4%	35.5%
2016	45.9%	19.9%	34.2%

Source: SEFSC Commercial ACL Dataset, 5/2/17.

Recreational

The majority of recreational greater amberjack is harvested from waters adjacent to Florida and Alabama (average of 88.8% from 2010-2016), followed by Louisiana and Mississippi, and Texas (Table 3.5.1.2). Recreational landings for Florida and Alabama, and Louisiana and Mississippi, are aggregated together because of the manner in which headboat landings are reported.

Table 3.5.1.2. Percentage of total recreational greater amberjack landings by state for 2010-2016.

Year	AL/FL	LA/MS	TX
2010	91.6%	6.6%	1.8%
2011	96.2%	1.8%	2.0%
2012	84.6%	13.1%	2.3%
2013	85.8%	12.3%	1.9%
2014	91.0%	6.2%	2.8%
2015	88.5%	9.4%	2.1%
2016	83.8%	15.5%	0.7%

Source: SEFSC Recreational ACL Dataset, 6/7/17.

3.5.2 Fishing Communities

The descriptions of Gulf communities include information about the top communities based on a "regional quotient" (RQ) of commercial landings and value for greater amberjack. The RQ is the proportion of landings and value out of the total landings and value of that species for that region, and is a relative measure. These communities would be most likely to experience the effects of the proposed actions that could change the greater amberjack fishery and impact participants, associated businesses, and communities within the region. If a community is identified as a greater amberjack community based on the RQ, this does not necessarily mean that the community would experience significant impacts due to changes in the fishery if a different species or number of species was also important to the local community and economy. Additional detailed information about communities with the highest RQs can be found for Gulf communities on the Southeast Regional Office's (SERO) Community Snapshots website at http://sero.nmfs.noaa.gov/sustainable_fisheries/social/community_snapshot/.

In addition to examining the RQs to understand how communities are engaged and reliant on fishing, indices were created using secondary data from permit and landings information for the commercial sector (Jepson and Colburn 2013, Jacob et al. 2013). Fishing engagement is primarily the absolute numbers of permits, landings, and value for all species. For commercial fishing, the analysis used the number of vessels designated commercial by homeport and owner address, value of landings, and total number of commercial permits for each community for all species. Fishing reliance includes the same variables as fishing engagement divided by population to give an indication of the per capita influence of this activity.

Using a principal component and single solution factor analysis, each community receives a factor score for each index to compare to other communities. Factor scores of both engagement and reliance were plotted for the communities with the highest RQs. Two thresholds of one and one-half standard deviation above the mean are plotted to help determine a threshold for significance. The factor scores are standardized; therefore, a score above a value of 1 is also above one standard deviation. A score above one-half standard deviation is considered engaged or reliant with anything above one standard deviation to be very engaged or reliant.

The reliance index uses factor scores that are normalized. The factor score is similar to a z-score in that the mean is always zero, positive scores are above the mean, and negative scores are below the mean. Comparisons between scores are relative; however, like a z-score, the factor score puts the community on a point in the distribution. Objectively, that community will have a score related to the percent of communities with similar attributes. For example, a score of 2.0 means the community is two standard deviations above the mean and is among the 2.27% most vulnerable places in the study (normal distribution curve). Reliance score comparisons between communities are relative; however, if the community scores greater than two standard deviations above the mean, this indicates that the community is dependent on fishing. Examining the component variables on the reliance index and how they are weighted by factor score provides a measurement of commercial reliance. The reliance index provides a way to gauge change over time in these communities and also provides a comparison of one community with another.

Landings for the recreational sector are not available by species at the community level; therefore, it is not possible with available information to identify communities as dependent on recreational fishing for greater amberjack. Because limited data are available concerning how recreational fishing communities are engaged and reliant on specific species, indices were created using secondary data from permit and infrastructure information for the southeast recreational fishing sector at the community level (Jepson and Colburn 2013, Jacob et al. 2013). Recreational fishing engagement is represented by the number of recreational permits and vessels designated as "recreational" by homeport and owners address. Fishing reliance includes the same variables as fishing engagement, divided by population. Factor scores of both engagement and reliance were plotted. Figure 3.5.2.3 identifies the top communities that are engaged and reliant upon recreational fishing in general.

Commercial Fishing Communities

The top greater amberjack communities are located in Florida, Alabama, and Louisiana (Figure 3.5.2.1). About 41% of greater amberjack is landed in the top three communities (Key Largo, Florida; Bayou La Batre, Alabama; and Destin, Florida), representing about 40% of the Gulf-wide ex-vessel value for the species (Figure 3.5.2.1). Several Florida Keys communities (Key Largo, Islamorada, and Sugarloaf Key) are included in the top communities.

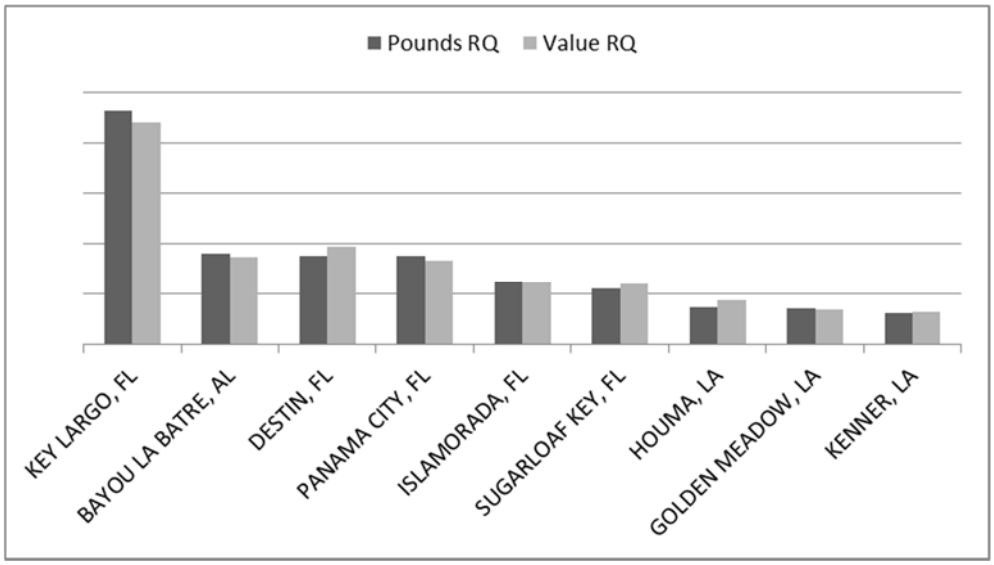

Figure 3.5.2.1. Top ten Gulf communities ranked by pounds and value RQ of greater amberjack. The actual RQ values (y-axis) are omitted from the figure to maintain confidentiality.
Source: SERO, Community ALS 2014.

The details of how these indices are generated are explained at the beginning of the Fishing Communities section. The primary communities that demonstrate high levels of commercial engagement and reliance include Bayou La Batre, Alabama and Golden Meadow, Louisiana (Figure 3.5.2.2).

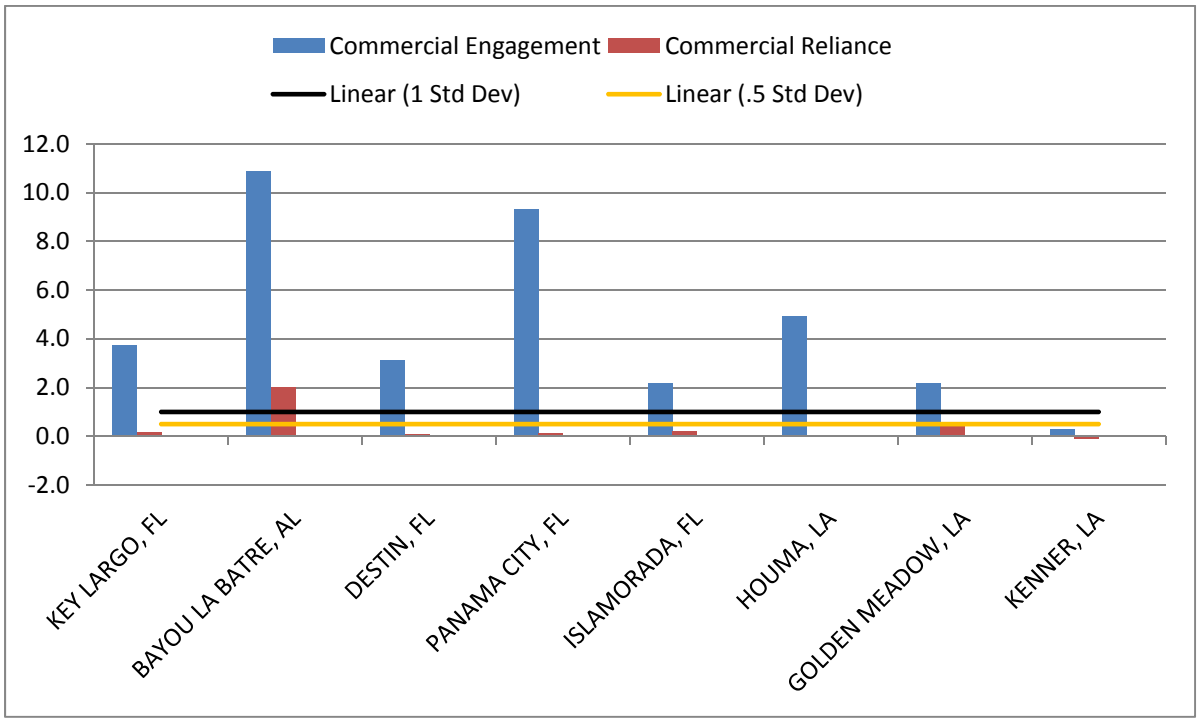

Figure 3.5.2.2. Top Gulf greater amberjack communities' commercial engagement and reliance.
Source: SERO, Community Social Vulnerability Indicators Database 2014 (ACS 2010-2014).

Recreational Fishing Communities

The details of how these indices are generated are explained at the beginning of the Fishing Communities section. Figure 3.5.2.3 identifies the top Gulf communities that are engaged and reliant upon recreational fishing in general. Two thresholds of one and one-half standard deviation above the mean were plotted to help determine a threshold for significance. Communities are presented in ranked order by fishing engagement and all 20 included communities demonstrate high levels of recreational engagement, although this is not specific to fishing for greater amberjack. Because the analysis used discrete geo-political boundaries, Panama City and Panama City Beach, Florida had separate values for the associated variables. Calculated independently, each still ranked high enough to appear in the top 20 list suggesting a greater importance for recreational fishing in that area.

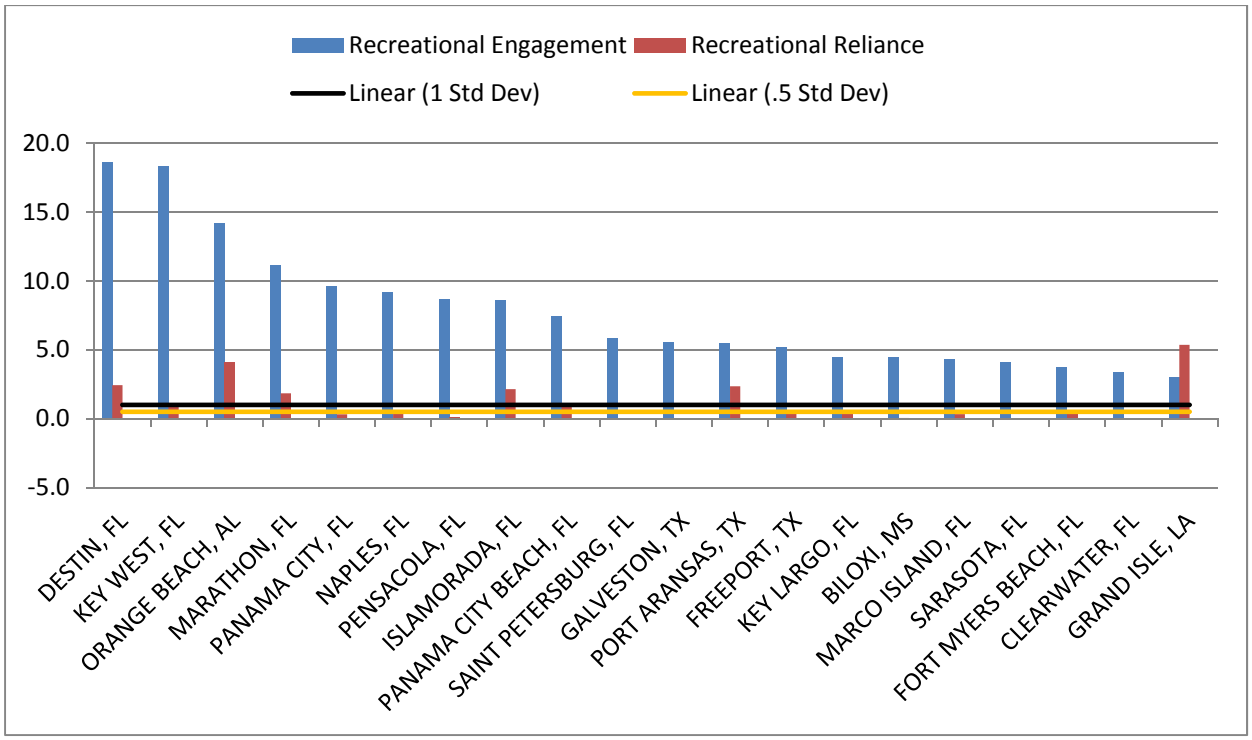

Figure 3.5.2.3. Top 20 recreational fishing communities' engagement and reliance.
Source: SERO, Community Social Vulnerability Indicators Database 2014 (ACS 2010-2014).

3.5.3 Environmental Justice

Executive Order (E.O.) 12898 requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. The main focus of E.O. 12898 is to consider "the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories…" This executive order is generally referred to as environmental justice (EJ).

Commercial and recreational fishermen and associated industries could be impacted by the proposed actions. However, information on the race and income status for groups at the different participation levels is not available. Although information is available concerning communities overall status with regard to minorities and poverty (e.g., census data), such information is not available specific to fishermen and those involved in the industries and activities, themselves. To help assess whether any EJ concerns arise from the actions in this amendment, a suite of indices were created to examine the social vulnerability of coastal communities. The three

indices are poverty, population composition, and personal disruptions. The variables included in each of these indices have been identified through the literature as being important components that contribute to a community's vulnerability. Indicators such as increased poverty rates for different groups, more single female-headed households and households with children under the age of five, disruptions such as higher separation rates, higher crime rates, and unemployment all are signs of populations experiencing vulnerabilities. Again, for those communities that exceed the threshold it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change.

Figure 3.5.3.1 provides the social vulnerability of the top commercial and recreational communities. Two communities exceed the threshold of one standard deviation above the mean for all three indices (Bayou La Batre, Alabama and Freeport, Texas). Several communities exceed the threshold of one-half standard deviation above the mean for more than one index (Panama City, Florida; Sarasota, Florida; and Galveston, Texas). These communities would be the most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change.

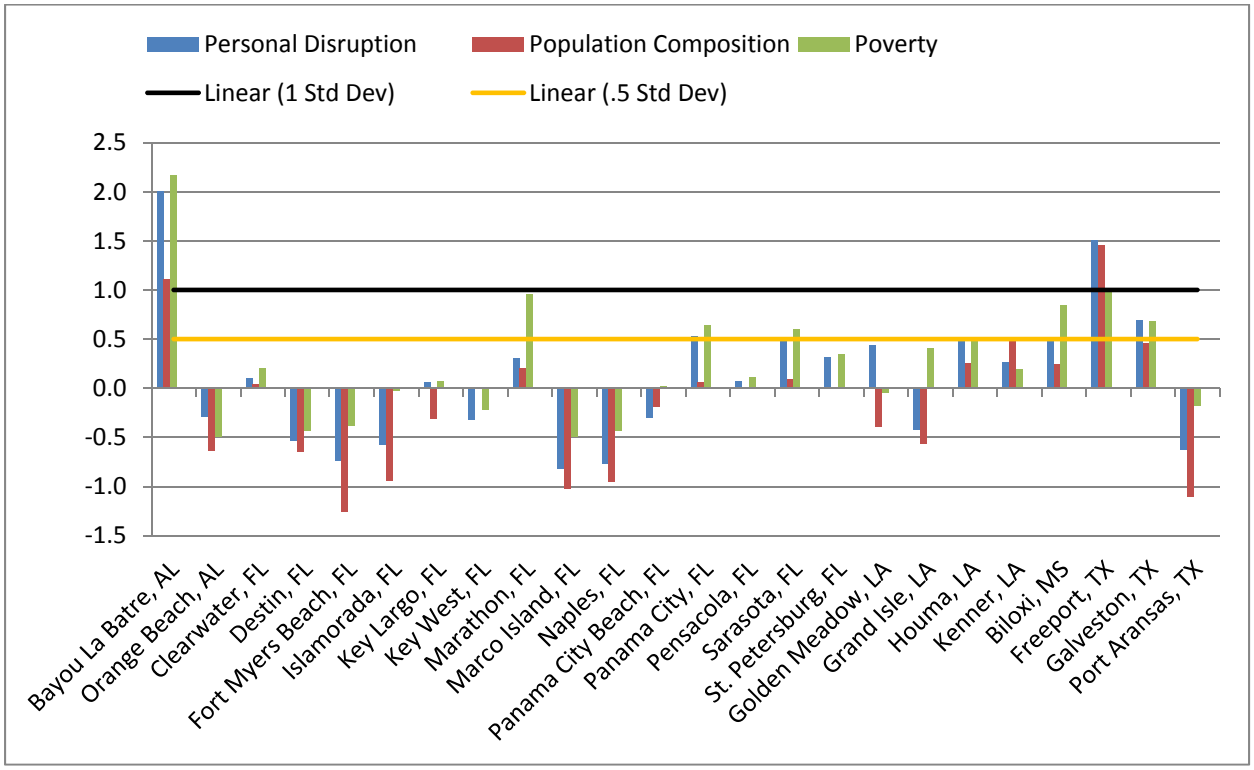

Figure 3.5.3.1. Social vulnerability indices for top commercial and recreational fishing communities.
Source: SERO, Community Social Vulnerability Indicators Database 2014 (ACS 2010-2014).

People in these communities may be affected by fishing regulations in two ways: participation and employment. Although these communities may have the greatest potential for EJ concerns, no data are available on the race and income status for those involved in the local fishing

industry (employment), or for their dependence on greater amberjack specifically (participation). However, the implementation of the proposed actions of this amendment would not discriminate against any group based on their race, ethnicity, or income status because the proposed actions would be applied to all participants in the fishery. Further, there is no known subsistence fishing for greater amberjack. Thus, the actions of this amendment are not expected to result in adverse or disproportionate environmental or public health impacts to EJ populations. Although no EJ issues have been identified, the absence of potential EJ concerns cannot be assumed.

3.6 Description of the Administrative Environment

3.6.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 *et seq*.), originally enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the EEZ. The EEZ is defined as an area extending 200 nautical miles from the seaward boundary of each of the coastal states. The Magnuson-Stevens Act also claims authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between the Secretary and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Appendix B. In most cases, the Secretary has delegated this authority to NMFS.

The Council is responsible for fishery resources in federal waters of the Gulf. These waters extend to 200 nautical miles offshore from the seaward boundaries of Alabama, Florida, Louisiana, Mississippi, and Texas, as those boundaries have been defined by law. The length of the Gulf coastline is approximately 1,631 miles. Florida has the longest coastline extending 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

The Council consists of seventeen voting members: 11 public members appointed by the Secretary; one each from the fishery agencies of Texas, Louisiana, Mississippi, Alabama, and Florida; and one from NMFS. The public is also involved in the fishery management process.

3.6.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf states exercises legislative and regulatory authority over their states' natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided on their respective web pages (Table 3.6.2.1).

Table 3.6.2.1. Gulf state marine resource agencies and web pages.

State Marine Resource Agency	Web Page
Alabama Marine Resources Division	http://www.outdooralabama.com/
Florida Fish and Wildlife Conservation Commission	http://myfwc.com/
Louisiana Department of Wildlife and Fisheries	http://www.wlf.louisiana.gov/
Mississippi Department of Marine Resources	http://www.dmr.ms.gov/
Texas Parks and Wildlife Department	http://tpwd.texas.gov/

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1 - Modify the Fishing Year for Greater Amberjack

4.1.1 Direct and Indirect Effects on the Physical Environment

Action 1 considers alternatives to modify the definition of fishing year for greater amberjack. Impacts of these alternatives on the physical environment would depend on the level of fishing effort (i.e., directed trips) by the commercial and recreational sectors. Greater amberjack is managed toward harvesting the annual catch target (ACT) that is defined for both the recreational and commercial sectors. The total allowable fishing days are established to achieve, without exceeding, the management target for each sector and could be affected by the fishing season selected in Action 1. Modification of the fishing year would change the start and end date of each fishing year but would not define the actual days open to harvest amberjack as this is considered in Action 2. Any combination of open days could be selected independently of the fishing year. However, the fishing season definition could affect the number of allowable fishing days if the harvest is expected to meet or exceed the ACT prior to the end of fishing season. In general, scenarios that allow for more total days would be expected to have greater impacts (i.e., direct effects) on the physical environment. The current fishing year for all Gulf of Mexico (Gulf) reef fish species (except yellowtail snapper) is January 1 – December 31. This action considers alternatives that would modify the fishing year for greater amberjack but would not affect the 30 other species managed under this fishery management plan (FMP). Indirect effects could also be observed if the nature of the fishery changes based on a modification to the fishing year. This could occur as any year-end closure would likely occur in the spring whereas this historically has occurred later in the fall. Again, this would not affect the total allowable harvest for greater amberjack but could affect the total number of days each year that greater amberjack could be harvested. A description of the impacts of greater amberjack fishing on reef habitat is presented in 4.1.2.

Alternative 1 (No Action) would maintain the fishing year currently defined as January 1 – December 31 each year for all species (except yellowtail snapper) managed in the Reef Fish FMP (GMFMC 1981). **Preferred Alternative 2** would modify the fishing season for greater amberjack to August 1 – July 31 while **Alternative 3** would change to fishing season to September 1– August 31. Both action alternatives contain two options. **Preferred Option a** would modify the recreational fishing year for the recreational sector while **Option b** would affect both the recreational and commercial sectors. A modification to the fishing year for **Preferred Alternative 2** or **Alternative 3** would open the fishing season later in the calendar year and allow harvest of a prized reef fish species during a portion of the year when harvest for other species may be restricted. However, the total allowable harvest would remain unchanged and harvest would be prohibited for each sector when their respective ACT was harvested.

The alternatives in Action 1 are not expected to alter the overall execution of the reef fish fishery and therefore, are not expected to have any significant direct or indirect effects on the physical environment.

4.1.2 Direct and Indirect Effects on the Biological Environment

Management actions that directly impact the biological and ecological environment include fishing mortality and the resulting population size, life history characteristics, and the role of the species within its habitat. Removal of fish from the population through fishing reduces the overall population size and reproductive potential. Action 1 would change the start of the fishing year from January 1 to August 1 or September 1 each year. This action does not affect the allowable harvest or the months open to harvest that are established in Action 2. However, if the recreational harvest rate was greater than anticipated, this sector would be closed and likely eliminate the spring season that could benefit the stock by reducing fishing mortality during a portion of the spawning season. Also, the allowable harvest was recently modified (GMFMC 2017) based on the Science and Statistical Committee (SSC) review of the SEDAR 33 update assessment results (SEDAR 2016) that determined that greater amberjack is overfished and continues to experience overfishing. The Gulf of Mexico Fishery Management Council (Council) recently took action to reduce the acceptable biological catch (ABC) to 1,182,000 lbs ww for 2018 which is a 538,000 lb ww reduction from the 2017 ABC (1,720,000 lbs ww). However, the ABC will increase to 1,489,000 lbs ww in 2019 and to 1,794,000 lbs ww in 2020 and beyond. This increase in allowable harvest is expected to affect the biological environment as biological impacts are directly related to harvest.

The alternatives in Action 1 are not expected to alter the overall execution of the reef fish fishery and therefore are not expected to have any significant change in direct effects to the biological environment. However, indirect effects may be experienced for **Preferred Alternative 2**, and **Alternative 3** if the total allowable fishing days change with a corresponding change in discarded fish (see Table 2.2.2). A reduction in days of allowable harvest could create additional regulatory discards and associated mortality on the stock. Discard mortality for greater amberjack is estimated at 20% (SEDAR 2014) and the total magnitude increases with increasing length of closed season. However **Preferred Alternative 2**, and **Alternative 3** are unlikely to result in any indirect adverse impacts on non-targeted species or protected species such as endangered or threatened whales, sea turtles, corals, or habitat areas of popular concern.

4.1.3 Direct and Indirect Effects on the Economic Environment

In this section, only the expected effects on the commercial sector are discussed. For the recreational sector, the combined effects of the fishing year modification and seasonal closures are discussed in Section 4.2.3.

Alternative 1 (No Action) is not expected to affect recreational or commercial fishing for greater amberjack and would therefore not be expected to result in effects to the economic environment. Since 2009, the commercial sector has reached its quota before the end of the fishing year and commercial harvest of greater amberjack has been subsequently closed. It is very likely then that the commercial quota would be fully taken regardless of the fishing year selected. In this case, the potential changes in ex-vessel revenues from **Preferred Alternative 2** (**Option b**) would not

differ from those of **Alternative 3** (**Option b**). However, the two alternatives may result in different distributional effects. In general, fishermen who would have first access to the stock would benefit more than the others, especially when taking into account the likely quota closure. Their benefits would be even higher if their access to the stock coincides with relatively higher ex-vessel prices. On the other hand, if prices are more favorable toward the latter part of the fishing year, it would tend to limit the benefits accruing to those who have first access to the stock. It may be noted that landings may spike at the start of the fishing year and may exert a downward pressure on prices, thus limiting the benefits of those who fish at the start of the fishing year. If landings start to dwindle, for example, toward the end of the fishing year when the quota is almost fully taken, prices may be relatively higher, benefiting in turn those who fish or continue to fish at the latter part of the fishing year before the quota is fully taken.

While there are many uncertainties associated with changes in fishing behavior in response to changes in fishing year, some possible distributional effects may be explored. To provide some insights into the potential distributional effects of modifying the fishing year, two figures are presented below. Figure 4.1.3.1 shows the average monthly landings in 2004-2008 and 2012-2016. In both periods, the commercial seasonal closure from March 1 through May 31 was in effect, but the quota closure was in effect only in 2012-2016 (although quota closures started in 2009). With the exception of 2012 when the quota was reached in March, quota closures generally occurred in July or August. The fishing year was January1-December 31 in both periods.

In 2004-2008, landings were relatively low early in the year for all states, except Florida (Figure 4.1.3.1). After the March 1-May 31 seasonal closure, landings spiked for all states although landings in Alabama and Mississippi remained at low levels. Landings in Louisiana and Texas tapered off toward the end of the fishing year, but landings in Florida gradually rose toward the end of the fishing year. A marked change occurred in the more recent years (2012-2016) partly due to the quota closures. Landings were relatively higher early in the year, with the exception of Mississippi. After the seasonal closure, landings rose but in a somewhat different pattern from that in the period when there was no quota closure. Landings in Florida peaked in June and dropped thereafter; landings in Alabama also peaked in June and dropped thereafter; landings in Texas gradually rose toward the end of the open season; and, landings in Louisiana show two spikes.

Modifying the fishing year would likely change the behavior of fishermen. If the fishing year were modified to be August 1-July 31 (**Preferred Alternative 2**), vessels in Louisiana and Texas would benefit more than others if fishing behavior is similar to that in 2012-2016 as may be gleaned from Figure 4.1.3.1. If fishing behavior reverts to that in 2004-2008, vessels in Florida would likely benefit more than others. For a September 1-August 31 fishing year (**Alternative 3**), fishing behavior could be like that in 2004-2008, and this would also benefit Florida vessels more than others. It may be expected, however, that fishing behavior under the September 1-August 31 fishing year would be unlike that in 2004-2008 as vessels in other states may increase their fishing effort. If fishing effort by these other vessels substantially increase, the quota could be reached within 5 or 6 months, as has been the case in the last few years. In the event that this

happens, Florida vessels would lose their historically substantial landings in January and February.

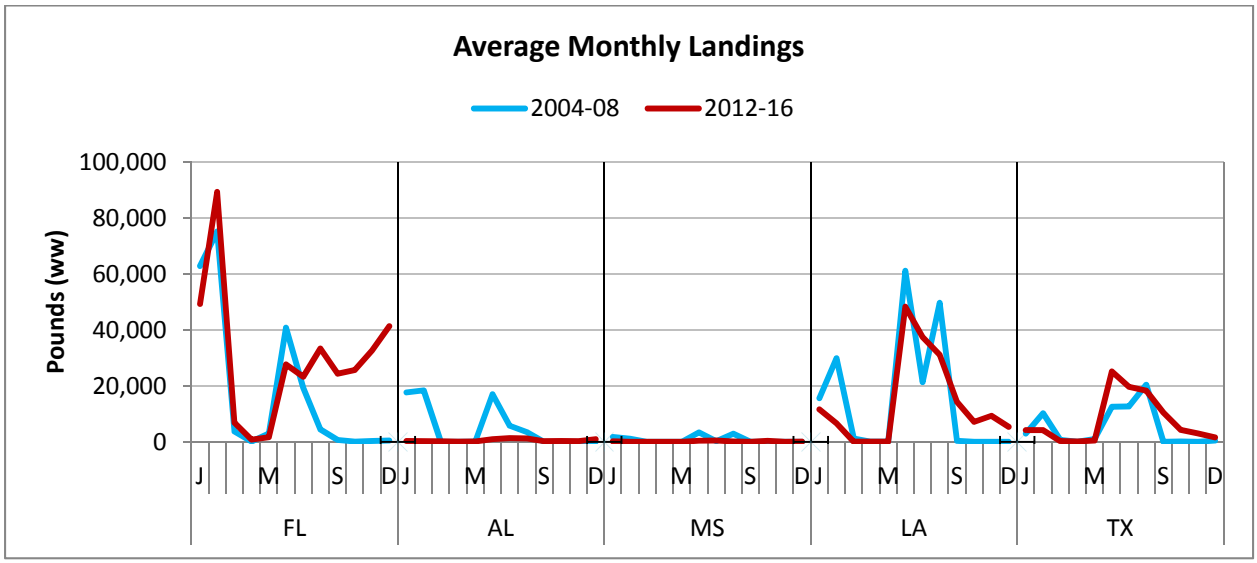

Figure 4.1.3.1. Average commercial monthly landings of greater amberjack, 2004-2008 and 2012-2016.
Source: SEFSC commercial (5/2/2017) ACL datasets.

4.1.4 Direct and Indirect Effects on the Social Environment

Annual landings are monitored based on the fishing year. Currently, the fishing year for all reef fish species except yellowtail snapper is the calendar year: January 1 – December 31. Starting the fishing season on January 1 means that landings begin to be counted toward the quota from January 1. As with some other species in the reef fish fishery, greater amberjack has an in-season closure provision; when each sector's quota is estimated to be reached, the fishing season is closed and further retention of greater amberjack is prohibited for the duration of the fishing year. Because all reef fish species with an in-season closure provision also have a January 1 fishing year start date, if more than one reef fish species is estimated to have met its quota and has an in-season closure take effect, there could be multiple species that are closed at the same time late in the calendar year. In-season closures are disruptive to fishermen, and multiple in-season closures of desirable species would compound these effects.

Additional effects would not be expected from retaining the current fishing year of January 1 – December 31 (**Alternative 1**), which is consistent with the fishing year for all other reef fish species except yellowtail snapper. However, if an in-season closure occurs before the end of the year, it could overlap with any other in-season closures of reef fish species, potentially compounding the negative effects of an in-season closure. Modifying the fishing year to begin on August 1 (**Preferred Alternative 2**) or September 1 (**Alternative 3**) would mean that landings would begin to be counted against the quota from the respective date. Under both alternatives and depending on the timing of the fixed closed season (Action 2), the fishing season would likely be open during the final months of the calendar year, which may be preferable to

some fishermen. However, effort is generally lower during these months across the Gulf, especially for the recreational sector. By extension, modifying the dates of the fishing year means that any in-season closure would include the end of the respective fishing year, e.g., July under **Preferred Alternative 2** or August under **Alternative 3**. Thus, the effects of **Preferred Alternative 2** and **Alternative 3** may be positive for some fishermen and negative for others, depending on their fishing activity, preferred target species, and preferred fishing season.

These differential effects depending on fishing activity and preferences would apply to participants of the recreational sector only (**Preferred Option 2a and Option 3a**), or to both the recreational and commercial sectors (**Options b**). Table 4.1.4.1 provides the in-season closures for both the recreational and commercial sectors for the years 2013 through 2017. Prior to 2013, there was no in-season closure for either sector. The 2-month fixed closed season of June and July has been in place for the recreational sector since 2011, and a 3-month fixed closed season of March through May has been in place for the commercial sector since 1998.

Table 4.1.4.1. In-season closures for the recreational and commercial sectors from 2013 through 2017.

Year	Recreational	Commercial
2013	None	July 1
2014	August 24	August 25
2015	September 28	July 19
2016	June 1	July 17
2017	March 24	June 20

Figure 4.1.3.1 provides the average commercial landings for several years (2004-2008 and 2012-2016) by state, both before and after in-season closures began to occur for the commercial sector. Assuming that current and future landings by state would be similar to these years, changing the fishing year to begin on August 1 (**Preferred Alternative 2**, **Option b**) would be expected to provide the greatest benefits to commercial fishermen in Florida, and slightly fewer benefits to Florida fishermen if the fishing year begins on September 1 (**Alternative 3**, **Option b**). Commercial fishermen in Louisiana would also be expected to benefit from beginning the fishing year on August 1 (**Preferred Alternative 2**, **Option b**), but these benefits would not be as likely if the fishing year begins on September 1 (**Alternative 3**, **Option b**). Texas may benefit somewhat from an August 1 fishing year start date, although for the years prior to the beginning of in-season closures, Texas' landings were relatively low during the final months of the calendar year. The fewest effects, either positive or negative, would be expected for Alabama and Mississippi's commercial fishermen, as landings were extremely low during the final months of the calendar year for most recent years.

Figure 4.1.4.1 provides the average recreational landings by state during 2-month waves for 2004 through 2013, the last year during which an in-season closure did not occur. A fixed closed season from June 1 through July 31 has been in place since 2011; these months coincide roughly with the greatest landings by each state prior to implementation of the fixed closed season and would remain closed under all of the alternatives for the recreational fixed closed season (Action

2). Assuming that current and future landings by state would be similar to landings from 2004 through 2013, changing the fishing year to begin on August 1 (**Preferred Alternative 2**, **Preferred Option a**) would be expected to provide the greatest benefits to Florida anglers where landings are highest. Gulf-wide, greater benefits would be expected for anglers by beginning the fishing year on August 1 (**Preferred Alternative 2**, **Preferred Option a**) than September 1 (**Alternative 3**, **Option a**), as August is a more desirable fishing month. Under a September 1 start date for the fishing year, in the event an in-season closure were to occur for the duration of the fishing year, anglers would be prohibited from retaining greater amberjack in August, even if the month is not included in the fixed closed season (Action 2).

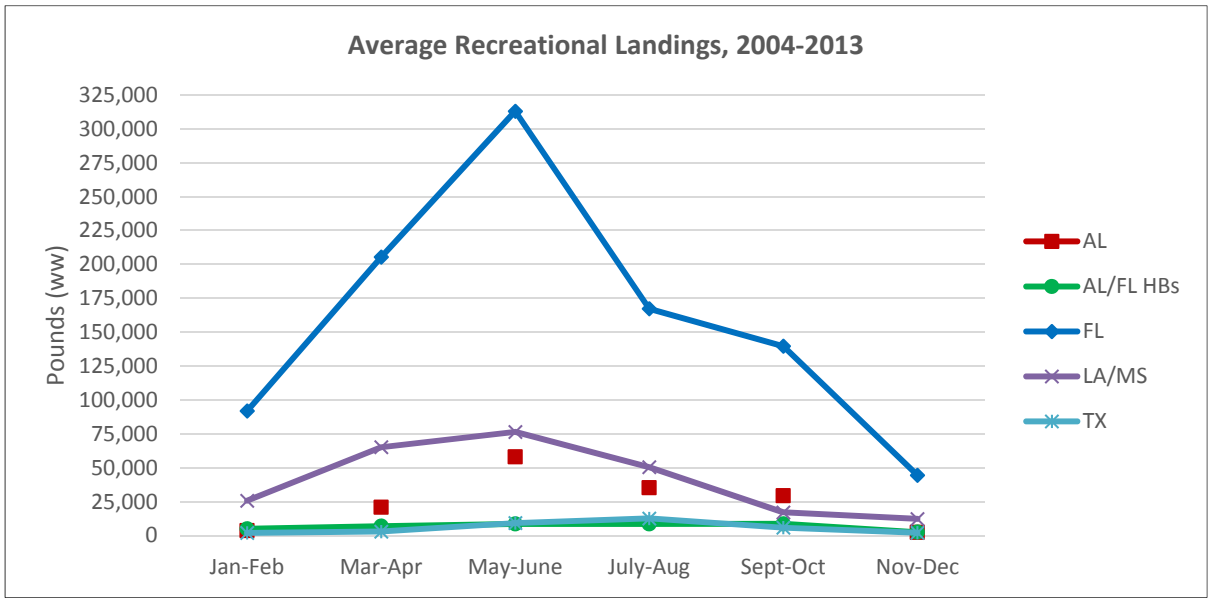

Figure 4.1.4.1. Average recreational landings of greater amberjack by 2-month waves, 2004-2013. Louisiana and Mississippi landings are aggregated for confidentiality reasons. Headboat landings for Alabama and Florida are combined as AL/FL HBs, as these landings were not separated out by state until 2013.
Source: SEFSC recreational (10/4/2017) ACL datasets.

4.1.5 Direct and Indirect Effects on the Administrative Environment

The alternatives in Action 1 are expected to create nominal differences in the direct and indirect impacts on the administrative environment. **Alternative 1** would have the least impact on the administrative environment, because the current fishing year is already established for all species in the Reef Fish FMP (GMFMC 1981). **Preferred Alternative 2**, and **Alternative 3**, are expected to have similar impacts on the administrative environment because they would modify the definition of fishing year for a single species in the FMP and would have an increased administrative burden relative to **Alternative 1**. **Preferred Alternative 2**, and **Alternative 3** would require landings from the recreational (**Preferred Option a**) or recreational and commercial sectors (**Option b**) to be calculated differently from other reef species. **Preferred Alternative 2** would require splitting wave 4 estimates of Marine Recreational Information

Program (MRIP) recreational landings estimates. This parsing would reduce the precision of the associated landings estimate and create additional administrative burden. **Preferred Option a** in **Preferred Alternative 2**, and **Alternative 3** would create different time periods for tracking the recreational and commercial landings relative to the sector annual catch limits (ACL) and ACTs. However, the acceptable biological catch that accounts for the combined landings of both sectors and monitoring this on annual basis would be more complicated if the sectors were operating in different fishing years. **Option b** in **Preferred Alternative 2**, and **Alternative 3** would include both sectors in the fishing year and simplify tracking of landings relative to management targets and producing harvest estimates for stock assessments. Continued public information and broadcasts by radio and press releases may be necessary to inform stakeholders when harvest for greater amberjack is closed, because it could be a different month and day each year based on natural changes in the resource and shifts in effort.

4.2 Action 2 – Modify the Recreational Fixed Closed Season for Greater Amberjack

4.2.1 Direct and Indirect Effects on the Physical Environment

It is unknown how many recreational anglers leave the dock intending to target greater amberjack, or how fishing behavior would change based on the various alternatives for closed seasons. The following comparison of alternatives is based on the number of available fishing days under each alternative. This comparison does not take into account fishing during the closed season or effort shifting outside of the closed season. The impacts to the physical environment may be underestimated in this analysis if there is increased effort shifting outside the closed season. Physical impacts to the environment could occur when gear such as weights, hooks, and anchors hit and damage the substrate and surrounding habitat. Recreational fishers typically use rod and reel (vertical lines) or spears to harvest greater amberjack.

Vertical lines

Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus, vertical line gear fishing generally occurs over hard bottom areas (GMFMC 2004). Vertical lines include multi-hook lines known as bandit gear, handlines, and rod-and-reels. Vertical-line gear is less likely to contact the bottom than longlines, but still has the potential to snag and entangle bottom structures and cause attached organisms, such as soft corals and sponges, to tear off or be abraded (Barnette 2001). In using bandit gear, a weighted line is lowered to the bottom, and then the lead is raised slightly off the bottom (Siebenaler and Brady 1952). The gear is in direct contact with the bottom for only a short period of time. Barnette (2001) suggests that physical impacts may include entanglement and minor degradation of benthic species from line abrasion and the use of weights (sinkers).

Anchor damage is also associated with vertical-line fishing vessels, particularly by the recreational sector where fishermen may repeatedly visit well marked or known fishing locations. Hamilton (2000) points out that "favorite" fishing areas, such as reefs, are targeted

and revisited multiple times, particularly with the advent of global positioning technology. The cumulative effects of repeated anchoring could damage the hard bottom areas and Essential Fish Habitat (EFH) where fishing for greater amberjack and other reef fish occurs. The for-hire sector and commercial sector that uses vertical line gear are typically known to anchor more frequently over the reef sites.

Spear and Powerhead

Spear guns are used by both the recreational and commercial sector to harvest greater amberjack, but represent a relatively minor component of both. Barnette (2001) summarizes a previous study that concluded spearfishing on reef habitat may result in some coral breakage. In addition, there could be some impacts from divers touching coral with hands or from re-suspension of sediment by fins (Barnette 2001).

The effects of the six alternatives considered under Action 2 to modify the recreational fixed closed season depend on the fishing year that is selected in Action 1. **Preferred Alternative 6** has proposed closure dates of January 1 – April 30, June 1 – July 31 and November 1 – December 31. If a closed recreational season for greater amberjack deters fishermen from making a fishing trip, then **Preferred Alternative 6** would likely have the greatest positive impacts on the physical environment because it results in a smaller number of fishing days open when all fishing year alternatives are considered (94-123 days). However, it is expected effort would shift to one or multiple other species. **Alternative 1** (June - July) would result in a 119-249 day fishing season depending upon the fishing year selected, **Proposed Alternative 1** (January - June) would result in a 94-184 day fishing season depending upon the fishing year selected **Alternative 2** would result in a 90-183 day fishing season, **Alternative 3** would result in a 94-184 day fishing season, **Alternative 4** would result in a 152 day fishing season and **Alternative 5** would result in a 153 day fishing season for every year under any Action Alternative combination. The comparison of the various fixed closed seasons and their associated fishing days can be found in Table 2.2.1. The alternatives in Action 2 will change the times of the year that recreational fishing for greater amberjack occurs. However, any impacts to the physical environment are expected to be minor because modifications to this specific fixed closed season will not change the fishing methods used or alter the execution of the reef fish fishery as a whole.

4.2.2 Direct and Indirect Effects on the Biological Environment

Action 2 would modify the recreational fixed closed season for greater amberjack. Based on the spawning season for greater amberjack, **Proposed Alternative 1** (January – June) may provide the greatest benefit to the resource and biological environment when compared to the status quo, **Alternative 1** (June – July) and **Alternatives 2-5** and **Preferred Alternative 6** as **Proposed Alternative 1** would close the recreational fishing season during peak spawning for all of the Gulf (March - May) (Harris et al. 2007; Murie and Parkyn 2008). However, it would entirely remove a spring recreational season for greater amberjack, which stakeholders have requested. Alternatively, little information exists to suggest that closing the greater amberjack recreational sector during the spawning period would provide greater biological benefits to the stock

compared to closing them during months including the majority of peak recreational fishing effort (May - August, **Alternative 4**), which reduces fishing days to a greater extent than a **Proposed Alternative 1**, **Alternatives 2**, **Alternative 3**, or **Alternative 5** closure from 2019 onward. Similarly, it is unknown if greater amberjack are more susceptible to fishing mortality during the spawning season and if there is a subsequent effect on spawning success or year class strength in future years. However, a study by Harris et al. (2007) suggested spawning aggregations of greater amberjack were targeted by fishers in the South Atlantic, but no evidence of this was presented. Diver observations in Belize documented greater amberjack in pair courtship while in schools of 120 fish (Graham and Castellanos 2005). It is unknown if fishers target these schools or aggregations of greater amberjack more heavily during spawning than at other times of the year; therefore, **Proposed Alternative 1**, **Alternative 3**, **Alternative 5**, and **Preferred Alternative 6** are expected to provide positive benefits to the resource by protecting greater amberjack during peak spawning. This could increase the reproductive success of the greater amberjack stock. Overall, the alternatives in Action 2 are not expected to alter the execution of the reef fish fishery as a whole or directly affect the biological environment.

4.2.3 Direct and Indirect Effects on the Economic Environment

Given current available data, economic effects on the recreational sector are expressed as changes in consumer surplus (CS) to recreational anglers. The economic effects on the for-hire vessel segment of the recreational sector may be generally expressed in terms of changes in producer surplus (PS) as proxied by net operating revenues (NOR). A critical component in assessing the changes in NOR is the expected changes in for-hire vessel trips. There is a good possibility that changes in the fishing year and seasonal as well as quota closures would result in changes in for-hire vessel trips. The magnitude of these possible changes, however, cannot be determined, thus the economic effects on for-hire vessels cannot be estimated. At any rate, the NOR value per angler trip has been estimated at $155 (2016 dollars) for charter vessels $54 (2016 dollars) for headboats.

Estimates of expected economic effects provided in this section are based on a decision tool developed and updated by National Marine Fisheries Service (NMFS). The assumptions, data and methods used to derive these estimates are detailed in Appendix D. Using this decision tool, the combined economic effects of Action 1 and Action 2 are estimated. Because Action 2 deals only with the recreational sector, the combined effects analysis focuses solely on this sector. In addition, only the economic effects on private anglers are estimated. The economic effects on for-hire vessels cannot be estimated due to issues related to estimating the number of for-hire vessel trips affected by this amendment. The greater amberjack stock is projected to rebuild by 2027, but due to data and model limitations, the decision tool only provides estimated economic effects for 2018, 2019, and 2020.

Alternative 1 (**No Action**), would maintain the current January 1-December 31 fishing year and January 1-June 30 seasonal closure for the greater amberjack recreational sector. This alternative is also called **Proposed Alternative 1**. As noted below and elsewhere, this alternative was proposed in a previous framework action which is currently under review by NMFS.

Alternative 1 is not expected to affect recreational fishing for greater amberjack, and would therefore not be expected to result in additional effects to the economic environment.

A major issue with the January 1-June 30 seasonal closure is that it is part of a framework action that is not yet implemented. In actuality, the June 1-July 31 seasonal closure is still in effect. For this reason, the current analysis proceeds by considering each of these two seasonal closures as baseline scenarios. A complicating feature of using these two baseline scenarios is that they are projected to result in different landings for 2019 and 2020 and therefore different CS values. This difference is highlighted in Table 4.2.3.1. The two baselines are denoted Baseline A (January 1-December 31 fishing year and June 1-July 31 seasonal closure) and Baseline B (January 1-December 31 fishing year and January 1-June 30 seasonal closure). One direct implication of this difference is that the economic effects would tend to be more negative when alternatives are compared against Baseline A, considering that the various seasonal closure alternatives would tend to constrain landings.

Table 4.2.3.1. Projected landings under two baseline scenarios, 2018-2020.

Baseline	Fishing Year	Closed Season	Projected Landings (lbs ww)		
			2018	2019	2020
A	Jan 1-Dec 31	Jun 1-Jul 31	716,713	902,185	1,086,985
B	Jan 1-Dec 31	Jan 1-Jun 30	716,713	897,800	897,800

Source: NMFS-SERO. Gulf_GAJ_rec_decision_Tool_Sep2017_v10.xlsm

The CS effects on recreational anglers are presented in Table 4.2.3.2 when alternatives are compared against Baseline A, and Table 4.2.3.3 when compared against Baseline B. For Baseline A, the January 1-June 30 seasonal closure is not considered as an alternative seasonal closure under any of the fishing year alternatives. However, the June 1-July 31 is an appropriate alternative seasonal closure, because it would show the effects of modifying the fishing year only. Similarly for Baseline B, the June 1-July 31 is not considered as an alternative under any of the fishing year alternatives but the January 1-June 30 seasonal closure is maintained as an appropriate alternative.

Whether the reference point is Baseline A or Baseline B, the CS effects of a given seasonal closure would be the same regardless of the fishing year chosen. This is true for 2018, 2019, and 2020. For example, the January 1-April 30 plus June 1-July 31 seasonal closure would result in a CS loss of about $47,000 in 2018, $142,000 in 2019, and $237,000 in 2020 regardless of the fishing year chosen (Table 4.2.3.2). A similar result holds true when alternatives are compared against Baseline B (see Table 4.2.3.3). It thus appears that modifying the fishing year would not change the economic effects of a given seasonal closure.

The preferred alternative for Action 1, which affects only the recreational sector, is an August-July fishing year (**Alternative 2**, **Option a**). For Action 2, the preferred alternative is a fixed closed season of January 1-April 30, June 1-July 31, and November 1-December 31 (**Alternative 6**). The combined effects of these preferred alternatives would result in CS reductions of approximately $0 in 2018, $32,000 in 2019, and $127,000 in 2020 under Baseline A (January-

December fishing year and June-July fixed closed season). The CS reductions under Baseline B (January-December fishing year and January-June fixed closed season) would be approximately $0 in 2018, $30,000 in 2019, and $30,000 in 2020. The reason for the higher CS reductions for 2019 and 2020 under Baseline A is the relatively higher projected landings under Baseline A, as shown in Table 4.2.3.1.

Regardless of the baseline used and fishing year chosen, the alternative that would result in the biggest negative effects would be the January 1-April 30 plus June 1-August 31 seasonal closure (**Alternative 5**). The best alternative, in terms positive effects, zero effects, or least negative effects, would be the January 1-March 31 plus May 1-July 31 seasonal closure (**Alternative 2**). In terms of economic effects, **Alternatives 3**, **4**, and **6** (**Preferred**) would generally fall between **Alternatives 2** and **5**, with **Preferred Alternative 6** having the lowest CS reductions among the three.

One key qualification to the discussion above is that effort and catch rates, which are based on past effort and catch rates, are kept constant from year to year across all alternatives. Under this condition, some of the alternatives would result in projected landings below those of the no action alternative or the annual quota, as shown in Table 2.2.2. One of these alternatives is the combined preferred alternatives for Action 1 and Action 2 (**Preferred Alternative 2** with **Preferred Option a**, **Preferred Alternative 6**). Without adjusting for changes in effort and catch rates, a portion of the quota would remain unharvested, resulting in CS reductions when compared against Baseline A or B. At present, however, introducing effort and catch rate changes to the analysis is not possible.

Table 4.2.3.2. Changes in recreational angler CS when alternatives are compared against Baseline A. The preferred alternative is in bold characters.

Baseline	Fishing Year	Closed Season	Change in CS (2016 dollars)		
			2018	2019	2020
A	Jan 1-Dec 31	Jun 1-Jul 31	N/A	N/A	N/A
	Jan 1-Dec 31	Jan 1-Mar 31, May 1-Jul 31	0	0	-$89,894
	Jan 1-Dec 31	Jan 1-Apr 30, Jun 1-Jul 31	0	-$2,487	-$97,565
	Jan 1-Dec 31	Jan 1-Mar 31, May 1-Aug 31	-$47,152	-$142,575	-$237,653
	Jan 1-Dec 31	Jan 1-Apr 30, Jun 1-Aug 31	-$54,822	-$150,246	-$245,324
	Jan 1-Dec 31	Jan 1-Apr 30, Jun 1-Jul 31, Nov 1-Dec 31	0	-$32,741	-$127,818
	Aug 1 - Jul 31	Jun 1-Jul 31	0	0	0
	Aug 1 - Jul 31	Jan 1-Mar 31, May 1-Jul 31	0	0	-$89,894
	Aug 1 - Jul 31	Jan 1-Apr 30, Jun 1-Jul 31	0	-$2,487	-$97,565
	Aug 1 - Jul 31	Jan 1-Mar 31, May 1-Aug 31	-$47,151	-$142,575	-$237,653
	Aug 1 - Jul 31	Jan 1-Apr 30, Jun 1-Aug 31	-$54,822	-$150,246	-$245,324
	Aug 1- Jul 31	**Jan 1-Apr 30, Jun 1-Jul 31, Nov 1-Dec 31**	**0**	**-$32,741**	**-$127,818**
	Sep 1 - Aug 31	Jun 1-Jul 31	0	0	0
	Sep 1 - Aug 31	Jan 1-Mar 31, May 1-Jul 31	0	0	-$89,894
	Sep 1 - Aug 31	Jan 1-Apr 30, Jun 1-Jul 31	0	-$2,487	-$97,565
	Sep 1 - Aug 31	Jan 1-Mar 31, May 1-Aug 31	-$47,152	-$142,575	-$237,653
	Sep 1 - Aug 31	Jan 1-Apr 30, Jun 1-Aug 31	-$54,822	-$150,246	-$245,324
	Sep 1-Aug 31	Jan 1-Apr 30, Jun 1-Jul 31, Nov 1-Dec 31	0	-$32,741	-$127,818

Source: NMFS-SERO. Gulf_GAJ_rec_decision_Tool_Sep2017_v10.xlsm

Table 4.2.3.3. Changes in recreational angler CS when alternatives are compared against Baseline B. The preferred alternative is in bold characters.

Baseline	Fishing Year	Closed Season	Change in CS (2016 dollars)		
			2018	2019	2020
B	Jan 1-Dec 31	Jan 1-Jun 30	N/A	N/A	N/A
	Jan 1-Dec 31	Jan 1-Mar 31, May 1-Jul 31	0	$2,256	$7,440
	Jan 1-Dec 31	Jan 1-Apr 30, Jun 1-Jul 31	0	-$231	-$231
	Jan 1-Dec 31	Jan 1-Mar 31, May 1-Aug 31	-$47,152	-$140,319	-$140,319
	Jan 1-Dec 31	Jan 1-Apr 30, Jun 1-Aug 31	-$54,822	-$147,990	-$147,990
	Jan 1-Dec 31	Jan 1-Apr 30, Jun 1-Jul 31, Nov 1-Dec 31	0	-$30,484	-$30,484
	Aug 1 - Jul 31	Jan 1-Jun 30	0	0	0
	Aug 1 - Jul 31	Jan 1-Mar 31, May 1-Jul 31	0	$2,256	$7,440
	Aug 1 - Jul 31	Jan 1-Apr 30, Jun 1-Jul 31	0	-$231	-$231
	Aug 1 - Jul 31	Jan 1-Mar 31, May 1-Aug 31	-$47,151	-$140,319	-$140,319
	Aug 1 - Jul 31	Jan 1-Apr 30, Jun 1-Aug 31	-$54,822	-$147,990	-$147,990
	Aug 1 - Jul 31	**Jan 1-Apr 30, Jun 1-Jul 31, Nov 1-Dec 31**	**0**	**-$30,484**	**-$30,484**
	Sep 1 - Aug 31	Jan 1-Jun 30	0	0	0
	Sep 1 - Aug 31	Jan 1-Mar 31, May 1-Jul 31	0	$2,256	$7,440
	Sep 1 - Aug 31	Jan 1-Apr 30, Jun 1-Jul 31	0	-$231	-$231
	Sep 1 - Aug 31	Jan 1-Mar 31, May 1-Aug 31	-$47,152	-$140,319	-$140,319
	Sep 1 - Aug 31	Jan 1-Apr 30, Jun 1-Aug 31	-$54,822	-$147,990	-$147,990
	Sep 1 - Aug 31	Jan 1-Apr 30, Jun 1-Jul 31, Nov 1-Dec 31	0	-$30,484	-$30,484

Source: NMFS-SERO. Gulf_GAJ_rec_decision_Tool_Sep2017_v10.xlsm

4.2.4 Direct and Indirect Effects on the Social Environment

Following the 2014 stock assessment (SEDAR 2014), the rebuilding plan was further revised (GMFMC 2015) by increasing the recreational minimum size limit and reducing the commercial trip limit. Although the Council considered modifying the recreational fixed closed season at that time, the Council ultimately took no action. Despite increasing the recreational minimum size limit in 2016, the rate of harvest was not reduced sufficiently, and the recreational season was not reopened following the fixed closed season from June 1 through July 31 (**Alternative 1**), resulting in negative effects, as the recreational sector ACL was determined to have been exceeded. Due to the ACL overage, the recreational sector ACL was reduced in the following year. The season was estimated based on the ACT, lowered from the ACL by the established buffer, and the recreational harvest of greater amberjack closed on March 24, 2017, for the remainder of the year. In public testimony, fishermen have objected to further increasing the minimum size limit beyond 34 inches fork length and the bag limit is currently one fish per person per day. Thus, modifying the fixed closed season from June 1 through July 31 (**Alternative 1**) was needed to constrain the recreational harvest and delay an in-season closure. The Council's selection of a January 1-June 30 fixed closed season (**Proposed Alternative 1**; GMFMC 2017) was intended to keep the season closed at the beginning of the 2018 year, providing the Council time to explore a new range of alternatives for a fixed closed season.

Alternatives to change the fishing year (Action 1) and to modify the fixed closed season are intended to delay an in-season closure, which is disruptive to fishermen who are negatively affected, and to provide fishing opportunities for greater amberjack at desirable times of the year for anglers, which would result in positive effects. There is a tradeoff in effects in that opening the season during the most desirable times for fishing (i.e., when effort is greatest) would result in the quota being landed faster, increasing the likelihood of an in-season closure. Thus, for the longest proposed fixed closed season (**Preferred Alternative 6**; 8 months), by including the popular month of August in the open fishing season, an in-season closure is still predicted to occur on October 2, if Alternative 1 is selected in Action 1. The in-season closure is predicted to occur on May 16 if Alternative 2 is selected in Action 1, or August 16 if Alternative 3 is selected in Action 1. Each of these predicted in-season closures would occur in the final month of the respective fishing year excluding months included in the fixed closed season. Thus, some negative effects would be expected to result from the predicted in-season closure under **Preferred Alternative 6**, but these effects would be expected to be less than for alternatives with a predicted in-season closure occurring more than one month before the end of the respective fishing year, excluding months included in the fixed closed season. These include **Alternatives 1-3** and **Proposed Alternative 1** for the current fishing year (Alternative 1 of Action 1). As with **Preferred Alternative 6**, however, **Proposed Alternative 1** and **Alternatives 2-3** would be expected to have an in-season closure occur in the final month of the respective fishing year if either of Alternative 1 or 2 is selected in Action 1.

In contrast with **Preferred Alternative 6**, the next longest fixed closed seasons (**Alternatives 4** and **5**; 7 months) include August in the fixed closed season and an in-season closure is not predicted for any of the fishing years that may be selected in Action 1. Although the negative effects of an in-season closure would be avoided under **Alternatives 4** and **5**, by including all 3

summer months (June, July, and August) in the fixed closed season, greater negative effects would likely result from the complete prohibition on recreational harvest of greater amberjack during the summer. Anglers vary in their preferences and opportunities to engage in fishing, but the benefits of providing one summer month for the harvest of greater amberjack would be expected to outweigh the lesser negative effects of the predicted in-season closure under **Alternatives 4** and **5**. (An exception to this would be if Alternative 3 is selected in Action 1, as an in-season closure would be expected to occur in the middle of August under **Preferred Alternative 6**. In this case, the greater expected benefits of an open August season would not be realized as the season would not remain open for the duration of the month.)

Part of the intent of the June 1 through July 31 fixed closed season (**Alternative 1**) was to close greater amberjack when the red snapper season was open, thereby providing an open season for one of the two highly prized species during the summer. Table 4.2.4.1 provides the months of the year that would be included in the fixed closed season under each alternative for the current fishing year (Alternative 1 in Action 1). All alternatives include June in the fixed closed season. Currently, the red snapper fishing season begins on June 1 each year and closes when the ACT for each of the private angling and federal for-hire components of the recreational sector is projected to be reached. However, the federal season for red snapper has decreased in recent years and has not always been open through the month of July. In these cases, both greater amberjack and red snapper have been closed at the same time during the popular summer month of July, and in some years, much of June as well (especially for the private angling component). Regardless of the length of the federal season for red snapper, including June in the fixed closed season for greater amberjack (**Alternatives 1-5**, **Proposed Alternative 1**, and **Preferred Alternative 6**) would mean greater amberjack is closed when the harvest of red snapper is open. Nevertheless, both species may be closed to one or both of the components of the recreational sector after the beginning of June (i.e., red snapper may not remain open for the entirety of June for both components). Under Alternative 1 of Action 1, by reopening for the month of July, **Proposed Alternative 1** would be more likely to provide benefits to the private angling component during this month, which has had earlier closures of red snapper than the federal for-hire component. However, compared with **Preferred Alternative 6**, there would be no spring season under **Proposed Alternative 1** (May would be open under **Preferred Alternative 6**), and given the fishing season selected in Action 1, an in-season closure would be expected to occur on July 12 under **Proposed Alternative 1**. In addition, negative effects would likely result, as the season would open July 1, followed shortly thereafter by a predicted in-season closure on July 12, only to reopen on August 1 with the beginning of the new fishing year. An in-season closure followed closely by a reopening of the season would likely be confusing and frustrating for the public.

Table 4.2.4.1. Months of the proposed fixed closed season (shaded in black) and months that may be open provided the ACT has not been estimated to have been met for the fishing year beginning on January 1 (Action 1, Alternative 1).

	Fishing season begins January 1:											
Alt 1	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Prop Alt 1	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Alt 2	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Alt 3	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Alt 4	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Alt 5	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Pref Alt 6	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Finally, the effects described above apply to 2018, only. The recreational ACL will increase 26% in 2019 and another 20.5% in 2020 and subsequent years unless modified (Table 1.1.1). Thus, any negative effects would be lessened or eliminated altogether. For example, under the selected fishing year in Action 1, no in-season closures are predicted to occur under the fixed closed season of **Preferred Alternative 6** beginning in 2019.

4.2.5 Direct and Indirect Effects on the Administrative Environment

The alternatives in Action 2 are expected to create nominal differences in the direct and indirect impacts on the administrative environment. Either **Alternative 1** would have the least impact on the administrative environment, because the current fixed closed season June 1 - July 31 is already established for the recreational sector (GMFMC 2008) and the proposed fixed closed season of January 1-June 30 is currently in the proposed rule stage (GMFMC 2017). **Alternatives 2-5** and **Preferred Alternative 6** are expected to have similar impacts on the administrative environment because they would result in the current seasonal closure (either **Alternative 1**) being modified. **Alternatives 1-5** and **Preferred Alternative 6** would all require landings from the recreational sector to be closely monitored for when the quota was projected to be reached so that it is not exceeded. Continued public information and broadcasts by radio and press releases may be necessary to inform stakeholders when harvest for greater amberjack is closed, because it could be a different month and day each year based on natural changes in the resource and shifts in effort.

4.3 Cumulative Effects

The cumulative effects of modifying the fishing year and recreational fixed closed season in this framework are similar to the cumulative effects described in the 2017 greater amberjack framework action to modify the allowable harvest and rebuilding plan (GMFMC 2017), the 2016 yellowtail snapper framework action to modify gear requirements and fishing year (GMFMC

2016), the 2015 greater amberjack framework action to modify allowable harvest and management measures (GMFMC 2015), and the 2012 modification to the greater amberjack rebuilding plan (GMFMC 2012), which are incorporated by reference and summarized below. Analysis of the current framework found that it could further enhance socioeconomic environments that will result from implementation of the Framework to Modify Greater Amberjack Allowable Harvest and Rebuilding Plan (GMFMC 2017). GMFMC 2017, GMFMC 2015, and GMFMC 2012 found that effects resulting from setting a new ACL and ACT are positive in the long-term, because they would ultimately restore/maintain the stock at a level that allows the maximum benefits in yield and commercial and recreational fishing opportunities to be achieved. However, short-term negative impacts on the socioeconomic environment associated with greater amberjack fishing have occurred and are likely to continue due to the need to limit directed harvest and reduce bycatch mortality. These negative impacts can be minimized by selecting measures that would provide the least disruption to the greater amberjack component of the reef fish fishery while reducing the potential to exceed the ACL and end overfishing. GMFMC 2016 found that impacts to physical and biological environments are likely negligible when modifying the fishing year. It also found that cumulatively, the direct and indirect effects of that action was likely to be minimal due to the specific stakeholders harvesting the single species.

The proposed actions are directed towards the management of naturally occurring species in the Gulf, so the introduction or spread of non-indigenous species should not occur. Additionally, the action does not propose any activity, such as increased ballast water discharge from foreign vessels, which is associated with the introduction or spread on non-indigenous species.

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's (EPA) climate change web page provides basic background information on these and other measured or anticipated effects. In addition, the Intergovernmental Panel on Climate Change (IPCC) has numerous reports addressing their assessments of climate change (http://www.ipcc.ch/publications_and_data/publications_and_data.shtml). Global climate changes could have significant effects on Gulf fisheries; however, the extent of these effects is not known at this time. Possible impacts include temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; changes in precipitation patterns and a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influencing the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs (Kennedy et al. 2002). Modeling of climate change in relation to the northern Gulf hypoxic zone may exacerbate attempts to reduce the area affected by these events (Justic et al. 2003). It is unclear how climate change would affect reef fishes, and likely would affect species differently. Climate change can affect factors such as migration, range, larval and juvenile survival, prey availability, and susceptibility to predators. In addition, the distribution of native and exotic species may change with increased water temperature, as may the prevalence of disease in keystone animals such as corals and the

occurrence and intensity of toxic algae blooms. Climate change may significantly impact Gulf reef fish species in the future, but the level of impacts cannot be quantified at this time, nor is the time frame known in which these impacts would occur. Actions in this amendment are not expected to significantly contribute to climate change through the increase or decrease the carbon footprint from fishing.

The effects of the proposed action are, and will continue to be, monitored through collection of landings data by NMFS, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations. Landings data for the recreational sector in the Gulf are collected through the Marine Recreational Information Program (MRIP), the Southeast Region Headboat Survey (SRHS), and the Texas Marine Recreational Fishing Survey. In addition, the Louisiana Department of Wildlife and Fisheries and the Alabama Department of Conservation and Natural Resources have instituted programs to collect greater amberjack recreational landings information in their respective states. Commercial data are collected through trip ticket programs, port samplers, and logbook programs, as well as dealer reporting through the individual fishing quota (IFQ) program.

Impacts from the *Deepwater Horizon MC252* oil spill are still being examined and peer-reviewed studies are only now just being published. However, the effects of this oil on greater amberjack and other reef fish populations are incomplete and unavailable (see 40 CFR § 1502.22) at this time because studies of the effects of the oil spill are still ongoing. If the oil impacts important habitat for these species or interrupts critical life history stages, the effects could reduce these species' population sizes. The oil itself could have adversely affected adult greater amberjack and other reef fish species. In a recent study, Weisberg et al. (2014) suggested the hydrocarbons associated with *Deepwater Horizon MC252* oil spill did transit onto the Florida shelf and may be associated with the occurrences of reef fish with lesions and other deformities. However, Murawski et al. (2014) reported that the incidence of lesions on bottom dwelling fish had declined between 2011 and 2012 in the northern Gulf.

CHAPTER 5. REGULATORY IMPACT REVIEW

5.1 Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866. This RIR analyzes the impacts this action would be expected to have on the greater amberjack component of the Gulf of Mexico (Gulf) reef fish fishery.

5.2 Problems and Objectives

The problems and objectives addressed by this action are discussed in Section 1.2.

5.3 Description of Fisheries

A description of the Gulf reef fish fishery is provided in Section 3.4.

5.4 Impacts of Management Measures

5.4.1 Action 1: Modify the Fishing Year for Greater Amberjack

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.3. The following discussion summarizes the expected economic effects of the preferred alternative.

Preferred Alternative 2-Preferred Option a would change the recreational fishing season from January 1-December 31 to August 1-July 31. Although a modification to the fishing season is expected to affect the temporal distribution of recreational greater amberjack harvests across the Gulf of Mexico, the establishment of a August 1-July 31 fishing year would not in and of itself be expected to result in changes to the aggregate recreational greater amberjack harvest. Therefore, **Preferred Alternative 2-Preferred Option a** would not be expected to result in economic effects because the consumer surplus derived from each recreationally harvested greater amberjack is assumed to be constant across the Gulf. The combined economic effects expected to result from the changes to fishing season (Action 1) and to the recreational fishing season closure (Action 2) are discussed in Section 5.4.2 below.

5.4.2 Action 2: Modify the Recreational Fixed Closed Season for Greater Amberjack

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.3. The following discussion summarizes the expected economic effects of the preferred alternative and the combined economic effects expected from Actions 1 and 2.

Preferred Alternative 6 would establish a fixed closed season of January 1-April 30, June 1-July 31, and November 1-December 31. Economic effects expected to result from **Preferred Alternative 6** are measured in changes in consumer surplus (CS) to recreational anglers between 2018 and 2020. CS estimates are derived based on a decision tool developed by NMFS (Appendix A). Because the January 1-June 30 seasonal closure is included in a framework action that is not yet implemented, the June 1-July 31 seasonal closure is currently in effect. Therefore, changes in consumer surplus expected to result from **Preferred Alternative 6** are computed relative to two baselines. Baseline A accounts for the January 1-December 31 fishing year and June 1-July 31 seasonal closure while baseline B is relative to the January 1-December 31 fishing year and January 1-June 30 seasonal closure.

Economic effects expected to result from Action 2 are equivalent to combined effects expected from Actions 1 and 2 because the change of the fishing year from January 1-December 31 to August 1-July 31 (**Preferred Alternative 2, Preferred Option a** in Action 1) would not affect the economic effects expected to result from **Preferred Alternative 6** (Action 2). The combined economic effects from these preferred alternatives are expected to result in CS reductions of approximately $0 in 2018, $32,000 in 2019, and $127,000 in 2020 under Baseline A (January-December fishing year and June-July fixed closed season). Similarly, the expected CS reductions under Baseline B (January-December fishing year and January-June fixed closed season) would be approximately $0 in 2018, $30,000 in 2019, and $30,000 in 2020.

5.5 Public and Private Costs of Regulations

The preparation, implementation, and monitoring of this or any federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Estimated costs associated with this action include:

Council costs of document preparation, meetings, public hearings, and information dissemination……$45,000

NMFS administrative costs of document preparation, meetings and review ….....$10,000

TOTAL ….....$55,000

5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: 1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; 2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; 3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or 4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this E.O. Based on the information provided above, this action has been determined to not be economically significant for the purposes of E.O. 12866.

CHAPTER 6. REGULATORY FLEXIBILITY ACT ANALYSIS

6.1 Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the Fishery Management Plan (FMP) or amendment (including framework management measures and other regulatory actions). The RFA is also intended to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the Regulatory Impact Review (RIR), the regulatory flexibility analysis provides: 1) A statement of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for the proposed rule; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; 5) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; and, 6) a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.

Additional information on the description of affected entities may be found in Chapter 3, and additional information on the expected economic effects of the proposed rule may be found in Chapter 4.

6.2 Statement of the Need for, Objective of, and Legal Basis for the Proposed Action

The purpose and need of the proposed action are presented in Chapter 1. The purpose of this action is to modify the recreational greater amberjack fishing year and fixed closed season. The need for this amendment is to extend the recreational greater amberjack fishing season while

constraining harvest to the management target, ending overfishing, and rebuilding the greater amberjack stock in the Gulf of Mexico (Gulf) in a timely manner.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) provides the statutory basis for this proposed rule.

6.3 Description and Estimate of the Number of Small Entities to which the Proposed Action would apply

The proposed rule would modify the recreational greater amberjack fishing year and fixed closed season. As a result, this rule would affect recreational anglers and federally permitted for-hire vessels fishing for greater amberjack in the Gulf. Although recreational anglers are directly affected by this proposed rule, they are not considered business entities under the RFA. For-hire vessels would be affected by this action but only in an indirect way. For-hire businesses (charter vessels and headboats) operate in the recreational sector, but these businesses only sell fishing services to recreational anglers and do not have harvest privileges to the greater amberjack quota. For-hire vessels provide a platform for the opportunity to fish and not a guarantee to catch or harvest any species, though expectations of successful fishing, however defined, likely factor into the decision by anglers to purchase these services. Because the effects on for-hire vessels would be indirect, they fall outside the scope of the RFA. It is therefore concluded that the proposed rule would not directly affect any small entities.

6.4 Description of the Projected Reporting, Record-keeping and Other Compliance Requirements of the Proposed Action

No duplicative, overlapping, or conflicting federal rules have been identified with this proposed rule.

6.5 Identification of All Relevant Federal Rules, which may Duplicate, Overlap or Conflict with the Proposed Action

The proposed rule would not introduce any changes to reporting and record-keeping and other compliance requirements which are currently required.

6.6 Significance of Economic Impacts on a Substantial Number of Small Entities

The proposed rule would have no effects on business entities under the RFA.

6.7 Description of the Significant Alternatives to the Proposed Action and Discussion of How the Alternatives Attempt to Minimize Economic Impacts on Small Entities

Because the proposed rule would not impact any small entities, the issue of significant alternatives to the proposed action is not relevant.

CHAPTER 7. LIST OF AGENCIES AND PERSONS CONSULTED

Name	Expertise	Responsibility	Agency
John Froeschke	Fishery Biologist	Co-Team Lead – Amendment development and introduction	GMFMC
Kelli O'Donnell	Fishery Biologist	Co-Team Lead – Amendment development, effects analysis, and environmental consequences	SERO
Tony Lamberte	Economist	Economic environment and Regulatory Flexibility Act analysis, Regulatory Impact Review, and Reviewer	SERO
Ava Lasseter	Anthropologist	Social analyses and Reviewer	GMFMC
Steven Atran	Senior Fishery Biologist	Reviewer	GMFMC
Christina Package-Ward	Anthropologist	Social analyses and Reviewer	SERO
Mara Levy	Attorney	Legal compliance and Reviewer	NOAA GC
Joelle Goodwin	Technical Writer Editor	Regulatory writer and Reviewer	SERO
Susan Gerhart	Fishery Biologist	Reviewer	SERO
Jeff Pulver	Fishery Biologist	Data analysis and Reviewer	SERO
Michael Larkin	Fishery Biologist	Data analysis	SERO
Assane Diagne	Economist	Economic Analysis, Regulatory Impact Review, and Reviewer	GMFMC
Carrie Simmons	Fishery Biologist	Reviewer	GMFMC
Nancie Cummings	Fishery Assessment Biologist	Reviewer	SEFSC

LIST OF AGENCIES CONSULTED

National Marine Fisheries Service
- Southeast Fisheries Science Center
- Southeast Regional Office
    - Protected Resources
    - Habitat Conservation
    - Sustainable Fisheries

NOAA General Counsel
U.S. Coast Guard

CHAPTER 8. REFERENCES

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APPENDIX A. GULF GREATER AMBERJACK DECISION TOOL

Modeling the Seasonal Closures for the Gulf of Mexico Greater Amberjack Recreational Sector

LAPP/DM Branch
NOAA Fisheries Service
Southeast Regional Office

Introduction

Greater amberjack (*Seriola dumerili*) are one of 32 reef fish species in the Fishery Management Plan (FMP) for the Reef Fish Resources of the Gulf of Mexico. The FMP provides management for reef fish species in the federal waters of the Gulf of Mexico (Gulf).

In 2016, a stock assessment was conducted for the Gulf greater amberjack (SEDAR 33 Update). Results from the assessment showed the greater amberjack stock is overfished and experiencing overfishing. A Framework Action is currently being drafted and its purpose is to establish management measures that will rebuild the stock. The current management measures for the recreational sector are a minimum size of 34 inches fork length (FL), closed season from June 1 to July 31, and one greater amberjack per angler bag limit. The Framework Action proposes changes to the annual catch limit (ACL) and annual catch target (ACT). A recreational decision tool was created to allow evaluation of the efficacy of the different closed seasons.

Data Sources

Recreational landings data for Gulf greater amberjack were obtained from the Southeast Fisheries Science Center (SEFSC) Marine Recreational Information Program (MRIP), the Texas Parks and Wildlife Department (TPWD) Creel Survey, Louisiana Creel survey (LA Creel) and the Headboat Survey (Headboat). MRIP, TPWD, and LA Creel conducted dockside intercepts to collect information on the size and number of greater amberjack caught by mode (charter, private, shore). The Headboat Survey collected number of greater amberjack through logbooks completed by vessel operators and size information through dockside intercepts.

Methods

Reductions in landings are necessary to achieve the Framework Action's proposed ACL and ACT. The management measure of different closed seasons was explored as a tool to reduce harvest. All the calculations were done using SAS (SAS Institute, Cary, NC).

Predicted Future Landings

The Framework Action currently being drafted will be imposed on the 2018 fishing year. An estimate of the future landings are required to explore the impact of different closed seasons, and determine the predicted landings relative to the ACLs and ACTs.

Frequently future landings are determined from taking a 3-year average of the three most recent years of complete data. Therefore, data from 2014 through 2016 are believed to be the best approximation of future harvest patterns. The average landings from 2014-2016 by 2-month wave were calculated to be the predicted future landings from January through June. However, the landings may change because the Gulf greater amberjack stock recently had a size limit increase from 30 to 34 inches fork length effective January 2016. The percent reductions from increasing the size limit were analyzed in SERO-LAPP-2014-9 for the 2015 Framework Action and these reductions are shown in Table 1. Therefore, the 2014 and 2015 landings were modified to account for the increase in the size limit. Additionally, the stock has been closed seasonally from June 1 through July 31 every year since 2011. Landings in June were determined from calculating the daily catch rate in May then multiplying it by the number of days in June. This method assumes the daily catch rate in May is the same as the daily catch rate in June. The June landings were calculated using the average landings in May from 2014-2016. The most recent years that the stock was open in August are 2012, 2013, and 2015. These landings were modified for the size limit change then the average daily catch rate for August was determined from 2012, 2013, and 2015 landings because the fishery was open in August during these years. Then the August daily catch rate was applied to July to determine the predicted July landings. This method assumes the daily catch rate in August is the same as the daily catch rate in July. The stock has been closed in September to December every year since 2014. September to December landings were determined from taking the average landings by 2-month wave from the most recent years when the recreational sector was open (2011-2013). Details of the landings used to create the predicted future landings are shown in Table 2. The predicted future landings and the landings used to generate the predicted landings are shown in Figure 2.

Table 1. Projected percent reductions of greater amberjack landings by mode for increasing the minimum size limit from 30 to 34 inches fork length. These numbers came from the size limit analysis done for the 2015 Framework Action (SERO-LAPP-2014-09).

Mode	Reduction
Headboat	15.7%
Charter	18.2%
Private	16.3%

Table 2. Details of the landings used to determine the predicted future recreational landings for greater amberjack.

	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Details	2014 and 2015 landings were modified due to the size limit increase. Average landings by wave from 2014-2016.		Determined average daily catch rate for May from 2014-2016 landings and applied it to number of days in June. Pooled average landings from May and June.	Determined average daily catch rate for August from 2012, 2013, and 2015 landings and applied it to number of days in July. Pooled average landings from July and August.	2011-2013 landings were modified due to the size limit increase. Average landings by wave from 2011-2013.	

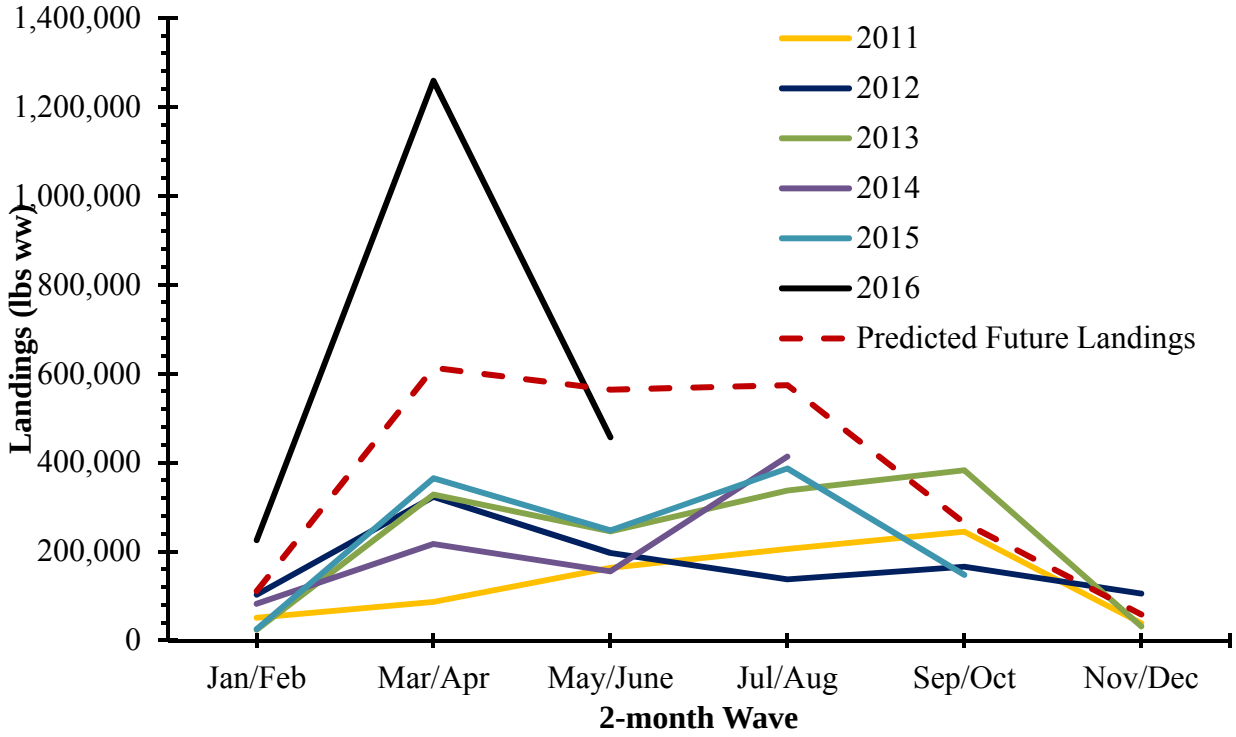

Figure 1. Gulf of Mexico greater amberjack recreational landings by wave from 2011 through 2016 and predicted future landings. All of the landings before 2016 were modified to account for the increase in the size limit implemented in January of 2016. The predicted future landings in May/June and July/August are higher than other years because they have been adjusted for the June-July closure.

Discards and Total Removals

The relative change in dead discards from exploring different regulations was calculated. A baseline of landings was established by assuming no regulation changes and the season was open all year. Then when a regulation change is implemented the reduced landings were converted to numbers of greater amberjack by dividing by the landings by the average weight. The current average weight of greater amberjack for the recreational sector was determined from the most recent assessment (SEDAR 33 Update), and was determined to be 23.81 lbs whole weight (ww). The numbers of greater amberjack released due to a regulation change were converted to dead discards by multiplying against the discard mortality rate of 20%. This discard morality rate came from the most recent assessment (SEDAR 33 Update). Additionally, the landings in weight were converted to numbers of dead greater amberjack by multiplying the landings by the average weight. Then total removals were determined from adding both the dead discards and the greater amberjack landings in numbers of fish.

Closed Season Analyses

Landings of greater amberjack are highly seasonal in the Gulf; thus, reductions associated with seasonal closures differ greatly depending upon the time period selected for closure (Figure 2). The headboat landings are available by month. The MRIP, TPWD, and LA Creel landings are available by 2-month wave and were separated into months by multiplying the proportion of days in each month relative to the total days in a wave. For example wave 3 consists of May/June where May has 31 days and June has 30 days (total wave landings = 61 days). Therefore, May landings are estimated by multiplying the wave 3 landings by 0.508 (31/61 = 0.508). The predicted future landings by month are shown in Figure 2.

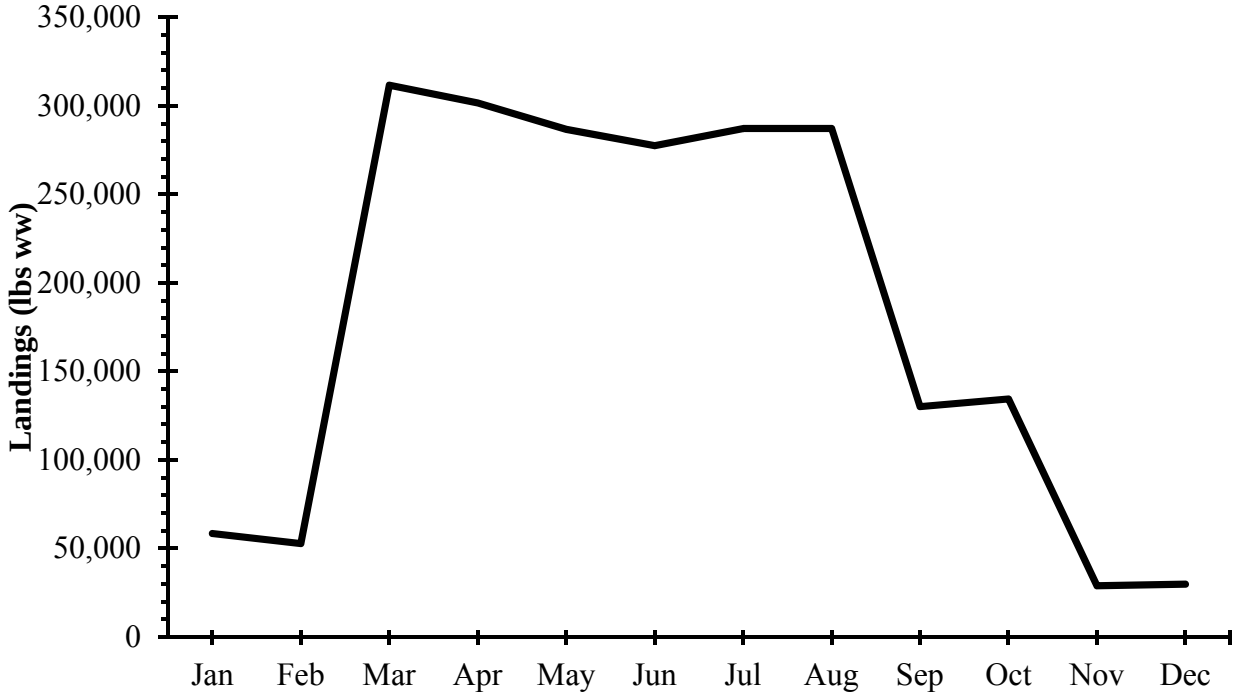

Figure 2. Distribution by month of predicted future landings for the Gulf of Mexico greater amberjack recreational landings. The predicted recreational landings include MRIP, Headboat, TPWD, and LA Creel landings.

The impact of a seasonal closure was modeled by converting the number of days closed into a percentage of days closed for a given month. The projected landings during that month were then reduced by the percentage of the month that was closed.

Decision Tool

Percent reductions calculated from changes in the closed season were applied to predicted future monthly landings to determine how much harvest would be reduced. These results were incorporated into a recreational decision tool. If month (*m*) was 100% closed, landings were set to zero pounds for all sectors. If a month was partially or fully open, the projected monthly recreational landings (RL) were computed as follows:

$$RL_{sector,m} = PRL_{sector,m} * O_m$$

Where PRL is the predicted future recreational landings and O is the percent of month open to fishing.

The RL and PRL were calculated for each sector (headboat, private, and charter). The sector landings (RL_{sector}) were combined to predict the total recreational landings.

The recreational decision tool (RDT) was implemented in Microsoft Excel using drop-down menus for inputting desired management measures (Figures 3). Excel was chosen because it is widely available for constituent use.

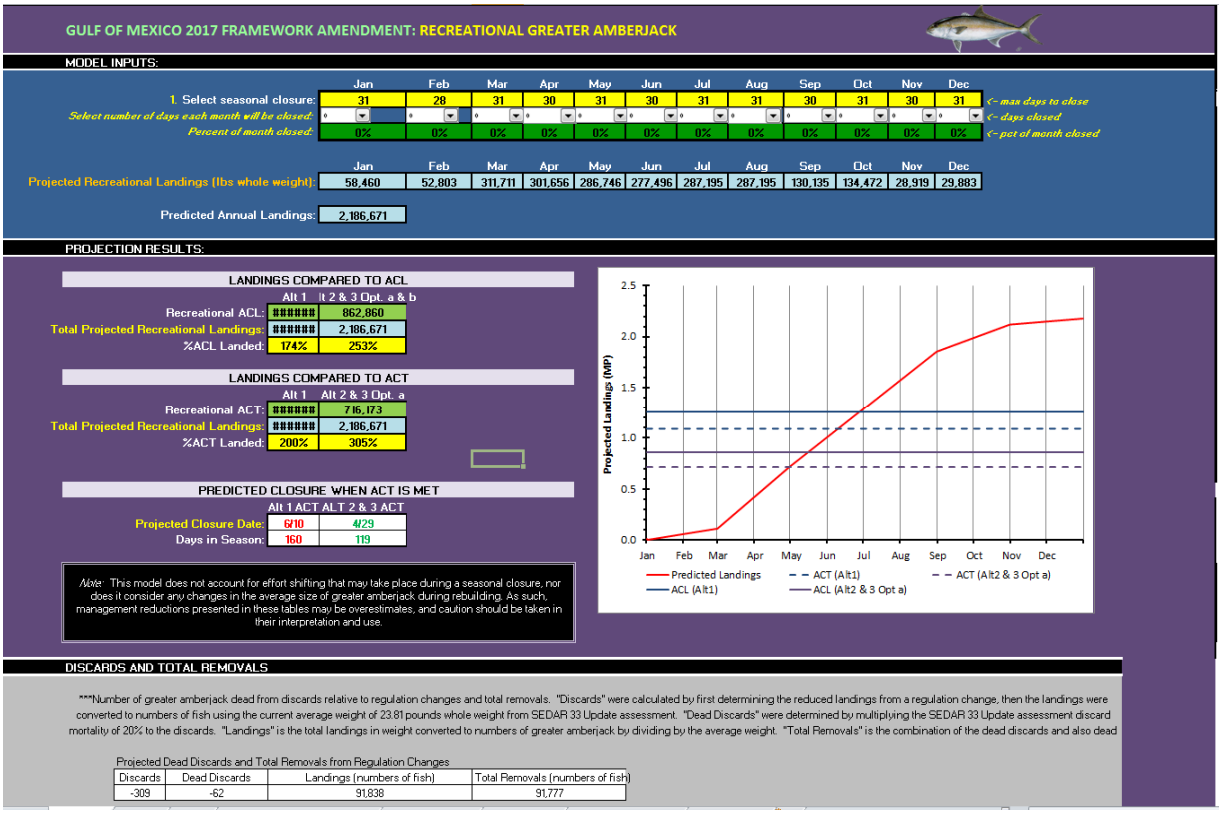

Figure 3. Screenshot for the recreational decision tool.

Results

The RDT allows a range of closed seasons and then the modified landings are compared to the proposed ACTs and ACLs in the Framework Action. Table 3 presents projected recreational annual landings and days open for the fishery from the variety of management alternatives using the current ACT (716,173 lbs ww). A mix of management measures can reduce the landing to prevent the ACT from being exceeded.

Table 3. Projected recreational landings (lbs ww) of Gulf of Mexico greater amberjack under a variety of proposed management measures that predict landings below the current ACT of 716,173 lbs ww. These results assume no effort shifting.

Closed Season	Days Open	Total Projected Landings (lbs ww)
Jun – Jul	119	1,621,980
Jan – Jul	153	610,605
Jan – Apr	77	1,462,042
Jul – Dec	119	1,288,872

Discussion

As with most projection models, the reliability of the RDT results are dependent upon the accuracy of their underlying data and input assumptions. We have attempted to create a realistic baseline as a foundation for comparisons, under the assumption that predicted future landings will accurately reflect actual future landings. Uncertainty exists in this projection, as economic conditions, weather events, changes in catch-per-unit effort, fisher response to management regulations, and a variety of other factors may cause departures from this assumption.

The RDT does not incorporate any changes in the average size of greater amberjack during rebuilding. As the stock rebuilds it is likely that the average size will increase. An increased average size would lead to fishermen capturing their quota more rapidly relative to previous years under similar effort levels. All of these factors would result in more pessimistic projections. As such, management reductions may be overestimates, and caution should be taken in their interpretation and use. By contrast, continued adverse economic conditions and rising fuel prices may reduce effort, which would counter these other trends.

References

SEDAR 33 Update. 2016. Stock assessment update report Gulf of Mexico greater amberjack (*Seriola dumereli*). Southeast Data, Assessment and Review. North Charleston, South Carolina. http://www.sefsc.noaa.gov/sedar/.

SERO-LAPP-2014-09. Modeling the combined effects of Gulf Framework Action proposed management measures for commercially and recreationally caught greater amberjack. LAPP/DM Branch. NOAA Fisheries Service, Southeast Regional Office. http://sero.nmfs.noaa.gov/sustainable_fisheries/lapp_dm/archives/documents/pdfs/2014/sero-lapp-2014-09_descrip_of_gaj_decision_tools_02242015.pdf

APPENDIX B. OTHER APPLICABLE LAWS

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for management of stocks included in fishery management plans (FMP) in federal waters of the exclusive economic zone. However, management decision-making is also affected by a number of other federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems that support those fisheries. Major laws affecting federal fishery management decision-making include the Endangered Species Act (Section 3.3.3), E.O. 12866 (Regulatory Planning and Review, Chapter 5) and E.O. 12898 (Environmental Justice, Section 3.5). Other applicable laws are summarized below.

Administrative Procedure Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the Act, the National Marine Fisheries Service (NMFS) is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider, and respond to public comment on those rules before they are finalized. The Act also establishes a 30-day waiting period from the time a final rule is published until it takes effect. Proposed and final rules will be published before implementing the actions in this amendment.

Coastal Zone Management Act

Section 307(c)(1) of the federal Coastal Zone Management Act of 1972 (CZMA), as amended, requires federal activities that affect any land or water use or natural resource of a state's coastal zone be conducted in a manner consistent, to the maximum extent practicable, with approved state coastal management programs. The requirements for such a consistency determination are set forth in NOAA regulations at 15 CFR part 930, subpart C. According to these regulations and CZMA Section 307(c)(1), when taking an action that affects any land or water use or natural resource of a state's coastal zone, NMFS is required to provide a consistency determination to the relevant state agency at least 90 days before taking final action.

Upon submission to the Secretary of Commerce, NMFS will determine if this plan amendment is consistent with the Coastal Zone Management programs of the states of Alabama, Florida, Louisiana, Mississippi, and Texas to the maximum extent possible. Their determination will then be submitted to the responsible state agencies under Section 307 of the CZMA administering approved Coastal Zone Management programs for these states.

Data Quality Act

The Data Quality Act (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such

as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions).

Specifically, the Act directs the Office of Management and Budget to issue government wide guidelines that "provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." Such guidelines have been issued, directing all federal agencies to create and disseminate agency-specific standards to: (1 ensure information quality and develop a pre-dissemination review process; (2 establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and (3 report periodically to Office of Management and Budget on the number and nature of complaints received.

Scientific information and data are key components of FMPs and amendments and the use of best available information is the second national standard under the Magnuson-Stevens Act. To be consistent with the Magnuson-Stevens Act, FMPs and amendments must be based on the best information available. They should also properly reference all supporting materials and data, and be reviewed by technically competent individuals. With respect to original data generated for FMPs and amendments, it is important to ensure that the data are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. Data will also undergo quality control prior to being used by the agency and a pre-dissemination review.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, (Public Law 89-665; 16 U.S.C. 470 *et seq.*) is intended to preserve historical and archaeological sites in the United States of America. Section 106 of the NHPA requires federal agencies to evaluate the impact of all federally funded or permitted projects for sites on listed on, or eligible for listing on, the National Register of Historic Places and aims to minimize damage to such places.

Historical research indicates that over 2,000 ships have sunk on the Federal Outer Continental Shelf between 1625 and 1951; thousands more have sunk closer to shore in state waters during the same period. Only a handful of these have been scientifically excavated by archaeologists for the benefit of generations to come. Further information can be found at: http://www.boem.gov/Environmental-Stewardship/Archaeology/Shipwrecks.aspx

The proposed action does not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places nor is it expected to cause loss or destruction of significant scientific, cultural, or historical resources. In the Gulf of Mexico (Gulf), the *U.S.S. Hatteras*, located in federal waters off Texas, is listed in the National Register of Historic Places. Fishing activity already occurs in the vicinity of this site, but the proposed action would have no additional adverse impacts on listed historic resources, nor would they alter any regulations intended to protect them.

Executive Orders (E.O.)

E.O. 12630: Takings

The E.O. on Government Actions and Interference with Constitutionally Protected Property Rights that became effective March 18, 1988, requires each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of a regulatory action must include a takings statement and, if appropriate, a Takings Implication Assessment. The NOAA Office of General Counsel will determine whether a Taking Implication Assessment is necessary for this amendment.

E.O. 12962: Recreational Fisheries

This E.O. requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods including, but not limited to, developing joint partnerships; promoting the restoration of recreational fishing areas that are limited by water quality and habitat degradation; fostering sound aquatic conservation and restoration endeavors; and evaluating the effects of federally-funded, permitted, or authorized actions on aquatic systems and recreational fisheries, and documenting those effects. Additionally, it establishes a seven-member National Recreational Fisheries Coordination Council (NRFCC) responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among federal agencies involved in conserving or managing recreational fisheries. The NRFCC also is responsible for developing, in cooperation with federal agencies, States and Tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the E.O. requires NMFS and the United States Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

E.O. 13089: Coral Reef Protection

The E.O. on Coral Reef Protection requires federal agencies whose actions may affect U.S. coral reef ecosystems to identify those actions, utilize their programs and authorities to protect and enhance the conditions of such ecosystems, and, to the extent permitted by law, ensure actions that they authorize, fund, or carry out do not degrade the condition of that ecosystem. By definition, a U.S. coral reef ecosystem means those species, habitats, and other national resources associated with coral reefs in all maritime areas and zones subject to the jurisdiction or control of the United States (e.g., federal, state, territorial, or commonwealth waters).

Regulations are already in place to limit or reduce habitat impacts within the Flower Garden Banks National Marine Sanctuary. Additionally, NMFS approved and implemented Generic Amendment 3 for Essential Fish Habitat (GMFMC 2005a), which established additional habitat

areas of particular concern (HAPCs) and gear restrictions to protect corals throughout the Gulf. There are no implications to coral reefs by the actions proposed in this amendment.

E.O. 13132: Federalism

The E.O. on Federalism requires agencies in formulating and implementing policies, to be guided by the fundamental Federalism principles. The E.O. serves to guarantee the division of governmental responsibilities between the national government and the states that was intended by the framers of the Constitution. Federalism is rooted in the belief that issues not national in scope or significance are most appropriately addressed by the level of government closest to the people. This E.O. is relevant to FMPs and amendments given the overlapping authorities of NMFS, the states, and local authorities in managing coastal resources, including fisheries, and the need for a clear definition of responsibilities. It is important to recognize those components of the ecosystem over which fishery managers have no direct control and to develop strategies to address them in conjunction with appropriate state, tribes and local entities (international too).

No Federalism issues were identified relative to the action to modify the management of the recreational harvest of greater amberjack. Therefore, consultation with state officials under Executive Order 12612 was not necessary. Consequently, consultation with state officials under Executive Order 12612 remains unnecessary.

E.O. 13158: Marine Protected Areas

This E.O. requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area. There are several marine protected areas, HAPCs, and gear-restricted areas in the eastern and northwestern Gulf. The existing areas are entirely within federal waters of the Gulf. They do not affect any areas reserved by federal, state, territorial, tribal or local jurisdictions.